HOSPITAL WASTE AUDIT MANUAL

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Report Prepared For:

Waste Management Branch
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ORTECH International

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HOSPITAL WASTE AUDIT MANUAL

Report Prepared By:

Ortech International

Report Prepared For:

Ottawa General Hospital
in conjunction with
Environment Canada
and
The Ontario Ministry of the Environment

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INTRODUCTION

In an attempt to address Canada's growing waste disposal problems, various governments have set goals for waste minimization programs. The target for waste diversion adopted by the federal and many provincial governments is 25% by 1992, and 50% by the year 2000. In addition, the federal government has extended the latter goal to cover packaging wastes, with the stipulation that this diversion must be equally accounted for by source reduction and recycling initiatives.

At the provincial level across Canada, the Environment Ministries are considering options, such as mandatory source separation of newsprint, aluminum, steel and glass containers for recycling and mandatory waste reduction plans, to encourage waste reduction in the Industrial, Commercial and Institutional (ICI) sectors. Other initiatives such as the Municipal Industrial Strategy for Abatement (MISA) in Ontario will require a more controlled approach to managing discharges of various chemicals into the sewer system. In addition, many provinces plan to introduce new restrictions on the use of incinerators. These changes will have profound implications for Canadian hospitals, affecting their procedures for product purchasing, waste handling and disposal of liquid and solid wastes.

Many municipalities are also taking steps to reduce the amounts and types of wastes that can be disposed to landfill and to the sewer systems. Regulations are currently in place in some areas that ban certain types of material received for disposal at landfills, or where disposal of these materials may mean the payment of levies at the landfill site. These items may include materials such as old corrugated cardboard, wood wastes, tires, drywall from construction sites, and fine paper. The Model Sewer Use Bylaw, which will control the release of materials to the sewer system and/or prohibit the discharge of many materials that are currently sewered, is also being adopted by municipalities across Ontario.

It can be seen, therefore, that hospitals, as members of the business community, have a leadership role to play in environmental protection and waste minimization for several reasons:

(1) protection of the environment;
(2) compliance with regulation and waste minimization goals set by federal, provincial and municipal governments;
(3) possible reduced disposal costs;
(4) possible reduced liabilities;
(5) possible reduced costs of raw materials;
(6) health care professionals are traditionally well respected in the community and often set examples which people follow.

It is with these reasons in mind that the waste audit and reduction program should be carried out. Waste audits will help hospitals to better understand the types and quantities of wastes, and how and where these wastes are generated.

This Manual attempts to provide Canadian hospitals with the tools they need to minimize their waste streams, through developing a better understanding of the types and quantities generated. It is presented in a step-by-step format to lead the reader through the assessment process, starting with the identification of current waste generation rates, estimation of waste types, waste generating areas and identification of possible waste minimization initiatives. However, it is the first step required in the development of cost effective waste reduction, reuse and recycling programs.

Before using this document, it will be important that you are familiar with federal guidelines and provincial regulations on the handling and disposal of wastes originating from a hospital. Helpful documents include these references:

(1) Guidelines for the Management of Biomedical Wastes in Canada - Report for the Canadian Council of Ministers of the Environment (CCME). (June, 1991).
(2) Canadian Hospital Association Environmental Policy.

(3) Provincial Regulations on the disposal of Biomedical and other Hazardous Wastes.

(4) Provincial Hospital Association Environmental Policies (if available)

Further sources can be found in the Reference Section.

Each section is divided into a series of forms which will help hospital representatives organize their waste data. In each case, supporting information will help explain how a particular form should be filled out, give examples on where to get information and how to undertake certain calculations.

Using This Manual

This Manual has been produced to help hospitals conduct assessments of the wastes they generate and to identify opportunities to reduce the quantities of these wastes going to disposal via practical, cost effective waste reduction, reuse and recycling initiatives. It is based on both ORTECH's experience in conducting a comprehensive waste audit at Ottawa General Hospital (OGH) in the fall of 1990, and on the premise that hospitals which are similar to OGH will generate similar types and quantities of waste.

Based on this experience and premise, a waste estimation tool was developed which would allow other hospitals to estimate their waste stream chracteristics without having to conduct their own detailed audits. This Manual focuses on describing how and when this tool may be applied to your hospital, and is divided into three distinct steps, as outlined in the flowchart:

(1) Verify That This Process Is Suitable for Your Facility

In order to use the estimation approach outlined in this Manual, you must first determine whether your hospital is similar to OGH, which is considered an "average" hospital according to Canadian standards. Parameters for comparison include waste generation rates and characteristics, hospital purchasing, services and operations.

The first task is to compare your hospital's wate generation rate to those of "average" Canadian hospitals whose waste may be broken down as follows:

Table 1 - Average Hospital Waste Generation Rates[1]

Waste Type	Daily Quantity (kg/bed/day)	% of Total
Biomedical		
Human Anatomical	0.05	0.8
Infectious, non-anatomical	0.27	4.9
General Wastes		
Kitchen	0.86	15.8
General	4.07	74.4
Other	0.23	4.2
Total	5.48	100.0

The average quantity of waste generated in hospitals has traditionally been reported as weight of waste generated per patient per bed per day. The quantity of waste has been found, in literature, to range from 2 to 7 kilograms per bed per day, with an average of 5-6 kilograms per bed per day in Ontario.

Given some basic hospital generation data, and a simple calculation, you can determine the daily waste generation per bed at your hospital, and verify that it falls within the "average" range. If it falls outside of this range, then this estimation approach is probably not appropriate for your facility, and we would recommend that you refer to the Companion Document instead.

The second task in the verification process is to determine what your hospital's waste generation rates are in the different waste categories, and to compare these to the values shown in the above Table. This step will involve completing Form 16 and Form 18, and comparing Form 18 information with Table 1, as

indicated in Section B.1.1. Again, if your hospital's data are not similar to Table 1, please refer directly to the Companion Document.

Many hospitals will have already compiled a great deal of waste generation data required to complete Forms 16 and 18. If waste generation information has not been previously collected and compiled for your facility, we recommend that you complete Part A, which will help you to develop an understanding of the activities performed, the wastes generated and the locations of generation in your hospital. Form 16 is a summary of information collected in Part A, and serves as a useful reference document.

The third and final task required to verify that this process is suitable for your facility is to continue to work through Part B.1 of the Manual, completing Sections B.1.2 and B.1.3, and Form 19, collecting the appropriate information, and verifying that the estimation approach is appropriate.

(2) Estimate the Composition of your Waste Streams

This task is described in Part B.2 and B.3 and will result in preliminary estimations of the types and quantities of materials generated in each of the major waste categories. It will also assist in predicting where these materials may be found in the hospital.

Your results from this task will depend on the choices you make. For instance, you will need to decide on whether to use the estimation or detailed estimation approaches, depending on the level of detail you require with respect to waste composition and location of generation. If you have identified in Part B.1 that certain areas of your hospital differ from the "average", you may choose to conduct a detailed estimation or audit in these areas, and an estimation approach in the balance of the hospital. The Manual attempts to guide you in making these decisions. However, there are no explicit rules. The choice depends on your own needs and comfort levels.

(3) Identify Waste Reduction, Reuse and Recycling Opportunities

This task is described in Part C and presents some of the appropriate waste reduction, reuse and recycling initiatives that may be suitable at a hospital. Some examples on how to address the costs involved are also provided.

The flowchart has been included at various stages of this Manual to help you to keep track of your location in the overall process, and this location is indicated via italics. In addition, the following Table 2 summarizes all forms included in this document, so, at a glance, you may identify their name and use, as well as sources of information required to complete them. This information will assist you in planning resources to complete the estimation process.

FLOWCHART: HOW THIS PROCESS IS ORGANIZED

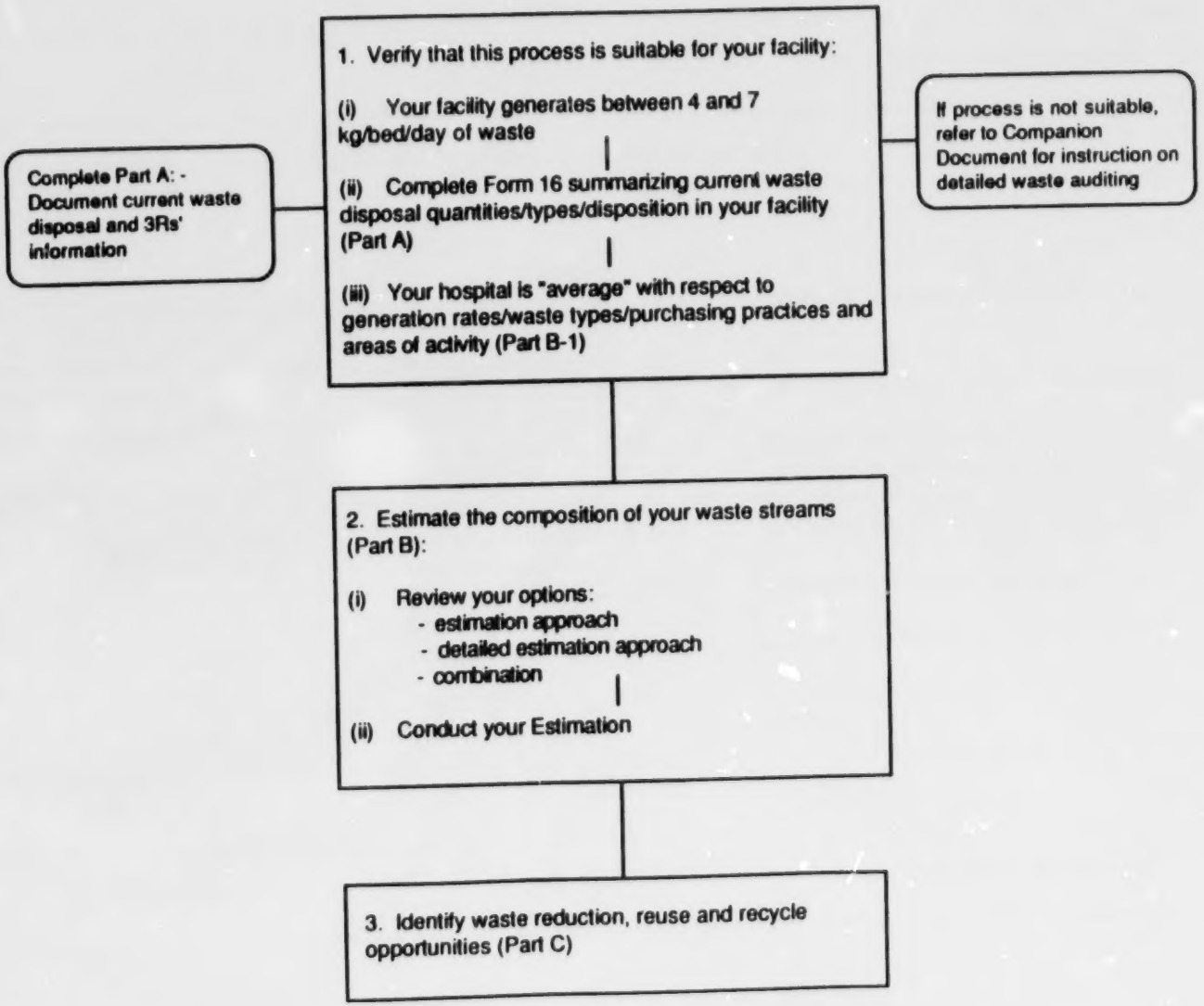

1. Verify that this process is suitable for your facility:
(i) Your facility generates between 4 and 7 kg/bed/day of waste
(ii) Complete Form 16 summarizing current waste disposal quantities/types/disposition in your facility (Part A)
(iii) Your hospital is "average" with respect to generation rates/waste types/purchasing practices and areas of activity (Part B-1)
Complete Part A: - Document current waste disposal and 3Rs' information
If process is not suitable, refer to Companion Document for instruction on detailed waste auditing
2. Estimate the composition of your waste streams (Part B):
(i) Review your options:
- estimation approach
- detailed estimation approach
- combination
(ii) Conduct your Estimation
3. Identify waste reduction, reuse and recycle opportunities (Part C)

TABLE 2 - Summary of Forms Included

Form #	Form Name	Form Use	Sources of Information
1	Hospital Profile	Basic hospital statistics	Various
2	Operations Covered by this Assessment	Activity levels/contacts in all unit operations	Various
Current Waste Disposal:			
3	General Wastes	Hauling information for general wastes	Hauler, Hospital Services
4	Confidential Wastes	Confidential shredding services information	Hospital Services, Shredding Firm
5	Biomedical Wastes	Disposition/quantity of annual biomedical wastes	Housekeeping, Purchasing Material Management, Hauler
6	Liquid and Chemical Wastes Registered for Off-site Secure Disposal	Disposition/quantity of annual liquid/chemical wastes	Housekeeping, and Ministry of Environment
7	Radioactive Wastes Registered for Off-site Secure Disposal	Disposition/quantity of annual radioactive wastes	Radiation Safety Officer designated for your facility
8	Pharmaceutical Wastes Requiring Secure Disposal	Disposition/quantity of annual pharmaceutical wastes	Disposal records, Pharmacy staff

TABLE 2 (contd.)

Form #	Form Name	Form Use	Sources of Information
Identifying Materials Currently Recycled and Reused Off-site:			
9	General Wastes	Type of recycling activity, location, weight per year recycled	Recycler, Purchasing Department, Program Initiator
10	Confidential Wastes	- do -	- do -
11	Liquid and Chemical Wastes	- do -	- do -
12	Other Wastes	- do -	- do -
Identifying Current On-site Reduction and Reuse Activities:			
13	General Wastes	Activity and location in hospital	Your hospital contacts
14	Liquid and Chemical Wastes	- do -	- do -
15	Other Wastes	- do -	- do -
16	Summary of Total Waste Disposed, Recycled & Reused Off-site by Waste Types	Summary of Forms 3-12	Forms 3-12
17	Estimating Current Waste Management Costs	Document breakdown of annual costs	Purchasing Department, Hauler, Other Staff
18	Your Hospital Waste Type Distribution	Breakdown of waste type and quantity generated	Form 16 and supporting documentation
19	Identifying the Use of Disposable Items	Use and location of use of items	Purchasing Department

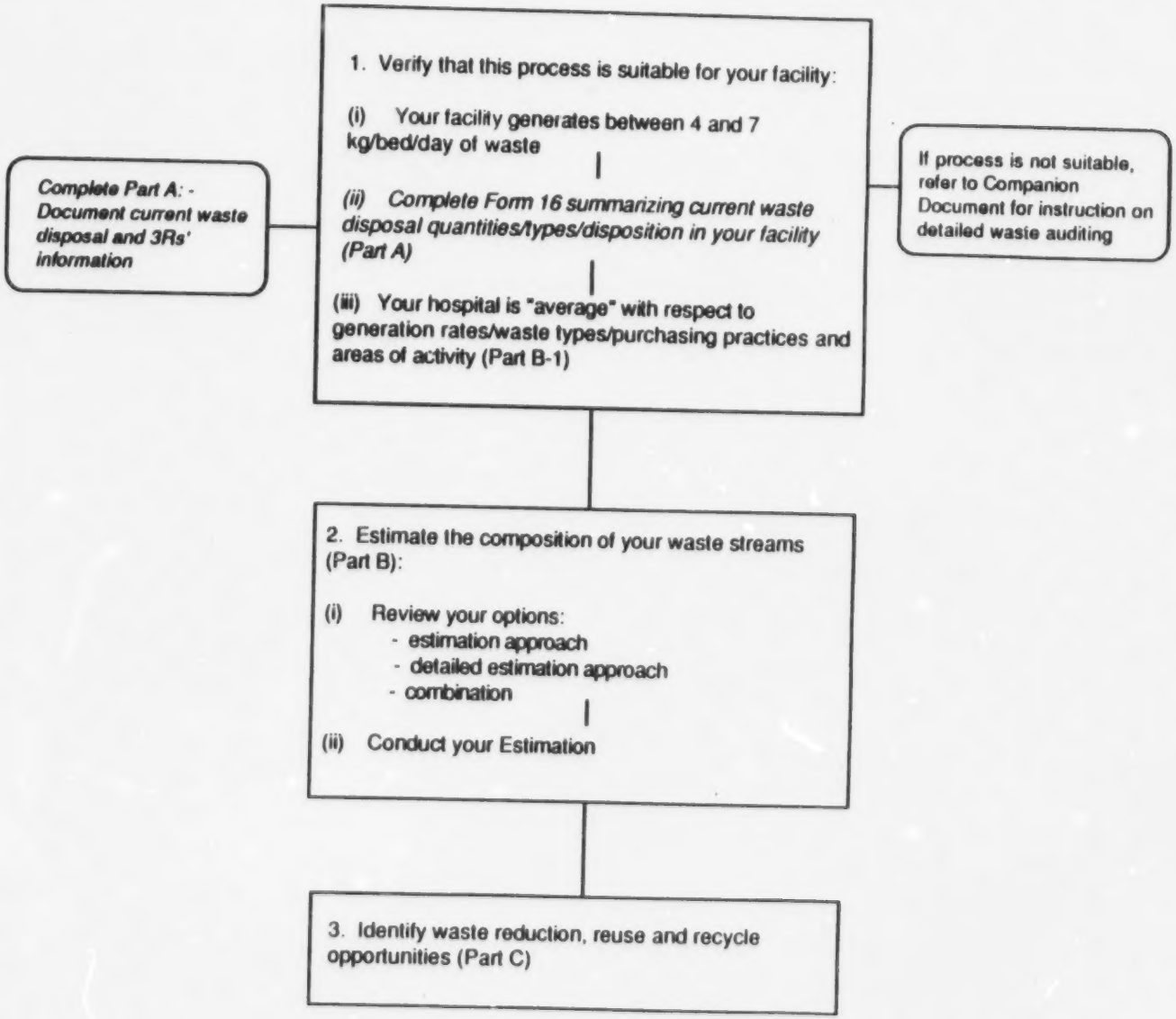
TABLE 2 (contd.)

Form #	Form Name	Form Use	Sources of Information
20	Estimating the Composition of General Solid Wastes	Documents waste composition by material type	Form 16 and supporting documentation
21	Identifying Where the Waste Is Generated	Documenting waste generation by area	Form 20, Appendix 1, Table 2
22	Identifying the Composition of Other Wastes		Purchasing records, and other staff
23	Liquid and Chemical Wastes Discharged from your Hospital	Documents quantities, disposition and areas of generation	Table 3
24	Radioactive Waste Components	- do -	Table 4, Radiation Safety Officer
25	Pharmaceutical Waste Composition	- do -	Various
26	Selected Potential Waste Reduction, Reuse or Recycling Programs		

PART A IDENTIFYING CURRENT WASTE DISPOSAL PRACTICES AND COSTS

This Section will assist you in developing an understanding of activities performed in your hospital which lead to waste production. It will also assist in pulling together waste generation information into a consistent format so that Form 16 may be completed, and you may proceed to Part B, completing verification that the estimation approach is suitable for your facility, and determining your hospital waste composition. The location of this Section in the overall process is indicated in the Flowchart.

FLOWCHART: HOW THIS PROCESS IS ORGANIZED


1. Verify that this process is suitable for your facility:
(i) Your facility generates between 4 and 7 kg/bed/day of waste
(ii) Complete Form 16 summarizing current waste disposal quantities/types/disposition in your facility (Part A)
(iii) Your hospital is "average" with respect to generation rates/waste types/purchasing practices and areas of activity (Part B-1)
Complete Part A: - Document current waste disposal and 3Rs' information
If process is not suitable, refer to Companion Document for instruction on detailed waste auditing
2. Estimate the composition of your waste streams (Part B):
(i) Review your options:
- estimation approach
- detailed estimation approach
- combination
(ii) Conduct your Estimation
3. Identify waste reduction, reuse and recycle opportunities (Part C)

1. GETTING ORGANIZED

The first step in the assessment process is documenting the profile of hospital activities specific to your facility, and characterizing your hospital by unit operations and sections.

1.1 Form 1: Hospital Profile

This form will help to summarize the information about the people who are involved in this effort and the types of activities that occur at your facility. It may be used as a reference for your own activities and enable you to compare your facility to others on a cursory level. All figures reported should reflect the activities of the preceding 12 months.

Supporting information for Form 1:

1.1 Record the date that these forms are completed.

1.2/
1.3 List the full hospital name, address and postal code.

1.4 Identify the representative at the hospital who will be able to serve as a long-term contact on general policy issues.

1.5 The person completing the forms may be a hospital employee, a contract person, or a consultant, who will be able to answer specific questions about the information recorded.

1.6 List the specialties for which your hospital has received special recognition. For example, include, here, whether your hospital is classified as any of the following: general, teaching, chronic care, cancer, children's, etc.

1.7 Give the total area occupied by the hospital, in square meters, including penthouses and mechanical shafts.

1.8 Give the total number of beds currently active for use at your hospital.

1.9 Give the average occupancy rate of these beds for the past year.

1.10 Record the average length of stay as calculated by hospital statistics.

1.11 Record the number of surgical procedures performed at your hospital over the past year. List the different types of procedures separately.

1.12 Give the total number of admissions to your hospital during the last year.

1.13 Give the number of out-patients served during the last year.

1.14 Give the full-time equivalent staff employed in your hospital, calculated by dividing total paid hours by paid hours per year for a full time staff member. A total should be available from hospital statistics.

1.15 If you are not familiar with what an Environmental Committee is, or does, see the next Section, 1.2.

In completing this form, you have summarized who is participating in waste assessment and waste minimization activities at your hospital and can now appreciate the general size, number of staff and level of patient activity.

FORM 1 - HOSPITAL PROFILE

General Information

1.1 Date of Form Completion: _____

1.2 Hospital Name: _____
1.3 Address: _____
_____
_____

1.4 Hospital Representative

Name: _____

Title/Dept. _____

Phone #: _____

1.5 Person Completing this Form

Name: _____

Title: _____

Address (if different from hospital): _____

_____

Phone #: _____

Hospital Information

1.6 Type of Hospital/Specialties: _____

1.7 Physical Size, m^2 or ft^2: _____ 1.8 # Beds: _____

1.9 Avg Bed Occupancy Rate: _____ 1.10 Avg Length of Stay: _____

1.11 # Surgical Procedures & Types/year: _____

_____

1.12 # Admissions/year: _____ 1.13 # Out Patients Served/year: _____

1.14 # Full-time Equivalent Staff: _____

1.15 Environmental Committee Members:

Employee Name	Department	Position	Phone #

1.2 Environmental Committee

In order to conduct all the activities required for a successful waste reduction program, an Environmental Committee should be established, with a designated "champion". This "champion", or co-ordinator, should be committed to the environment, be outgoing, well organized, and have good interpersonal and communication skills. He/she should be someone who knows the hospital well, can make things happen, and help with any problems that arise. This person may also be called on to liaise with other hospitals in the area that wish to discuss possible waste minimization programs.

A key need for any successful waste reduction program is the approval by senior management of the activity, plus a commitment by them that they will seriously consider acting on recommendations resulting from the audit. Without this senior management backing, it will be much more difficult for the waste audit team to get co-operation from other members of the hospital staff. In addition, if senior management are not committed to the project, it may be very frustrating to try to implement practical waste reduction opportunities which are identified as being attractive.

Responsibilities of the Environmental Committee

- Conduct or contract for a waste assessment
- Identify potential waste reduction, reuse and recycling initiatives
- Calculate financial implications of proposed waste minimization programs
- Select specific waste reduction, reuse or recycling projects and obtain senior management commitment
- Implement waste minimization programs, which include:
    - scheduling
    - contracts with recyclers, where required
    - education of in-house staff and program promotion
    - designating responsibilities, i.e. to housekeeping, volunteers, etc.
    - investigating sources of potential funding or assistance (e.g. government, suppliers)

- reporting on program successes through newsletters
- identification of new opportunities
- troubleshooting
- maintaining current awareness of government regulations.

Environmental Committee Representation

This committee should represent all key areas of activities in the hospital. Consider including individuals knowledgeable about their own areas from:

- Housekeeping
- Nursing
- Infection control
- Materials management
- Administration
- Purchasing
- Hospital volunteers
- Professional Services (e.g. Paramedical)

Include all levels of staff - not only senior managers.

1.3 Form 2: Operations Covered by This Assessment

This form will help to identify the types of unit operations (activities and services) at your hospital, which are to be included in your overall waste evaluation. Hospital activity areas may be grouped into 6 general sections according to similar types of wastes produced. These 6 sections are given below, with a brief description of each as follows:

- Patient Care: The bed areas (e.g. obstetrics)
- Patient Service: Areas that provide diagnostic, therapeutic, or other medical services to patients (e.g. clinics, pharmacy, social work)
- Laboratories: Areas that conduct sample analysis (e.g. microbiology)
- Administration: Office areas (e.g. purchasing, finance, M.I.S.)
- Support Services: Areas which supply functions that maintain the building viability and individual comfort and necessities (e.g. cafeteria)
- Miscellaneous: Any activity that is not included in the sections above (e.g. building exterior)

Supporting information for Form 2 for each of the general sections above:

2.1 Note the section to ensure you have the appropriate form.

2.2 This column gives examples which may be included at your facility. List the unit operations (separate areas of activity) that fall into each section at your hospital. Obtain building plans to assist you in this effort and label the areas on the floor plans to be sure you are including all areas. Contact building administration and housekeeping for records.

2.3 Note the Activity Descriptor for each unit operation listed.

2.4 For each unit operation, record the activity level, e.g. for patient care - record # of active beds for each unit operation. Obtain this information from hospital statistics.

2.5 Obtain the name of a contact person for each unit operation identified. This person should be familiar with waste generation and handling methods, and the activities in their areas.

2.6/ 2.7 List the phone number of the contact person and the room number where they can be most readily found.

FORM 2 - OPERATIONS COVERED BY THIS ASSESSMENT

2.1 Section: Patient Care

2.2 Unit Operations	2.3 Activity Descriptor	2.4 Activity Level	2.5 Contact Person	2.6 Phone #	2.7 Room #
Intensive Care Unit (ICU)	Beds				
General Medicine:	Beds				
Pulmonary					
Gerontology					
Cardiology					
Rheumatology					
Hematology					
Oncology					
Nephrology					
Neurology:	Beds				
Neurosurgery					
Neurology ICU					
Vascular Neurology					
Gynecology	Beds				
Nursery	Beds				
Obstetrics	Beds				
Ophthalmology	Beds				
Patient Check Out	Beds				
Orthopedics	Beds				
Psychiatry	Beds				
Short Stay Unit	Beds				
Surgery: Plastic General Thoracic	Beds				
Urology	Beds				
Cancer Lodge	Beds				
Others:	Beds				

Form 2 (Contd.)

2.1: Section: Patient Service

2.2 Unit Operations	2.3 Activity Descriptor	2.4 Activity Level	2.5 Contact Person	2.6 Phone #	2.7 Room #
Diagnostic:					
Cardiopulmonary	1000 procedures				
Gastrointestinal Unit	1000 procedures				
Neurophysiology	1000 patients				
Nuclear Medicine	1000 patients				
Obstetrics/Ultrasound	1000 patients				
Ophthalmology	1000 patients				
Radiology	1000 exams				
Others					
Service:					
Biomedical Engineering	1000 Repairs				
Cancer Clinic	1000 Patients				
Dialysis	1000 Patients				
Emergency	1000 Patients				
Fertility Clinic	1000 Patients				
Labour & Delivery	1000 Patients				
Pharmacy	1000 Doses				
Recovery, Anaesthesia	1000 Operations				
Surgery	1000 Operations				
Others					

Form 2 (Contd.)

2.1: Section: Patient Service

2.2 Unit Operations	2.3 Activity Descriptor	2.4 Activity Level	2.5 Contact Person	2.6 Phone #	2.7 Room #
Therapeutic:					
Audiology	1000 Procedures				
Occupational & Physiotherapy	1000 Patients				
Psychology	1000 Patients				
Psychiatry	1000 Patients				
Respiratory Therapy	# of Staff				
Social Work	# of Staff				
Speech Therapy	1000 Patients				
Others:					

Form 2 (Contd.)

2.1 Section: Laboratories

2.2 Unit Operations	2.3 Activity Descriptor	2.4 Activity Level	2.5 Contact Person	2.6 Phone #	2.7 Room #
Biochemistry	1000 Samples				
Blood Bank	1000 Samples				
Hematology	1000 Samples				
Infection Control	1000 Samples				
Microbiology	1000 Samples				
Oncology (Cancer Lab)	# of Staff				
Pathology	1000 Operations				
Morgue	# of Autopsies				
Research Lab	# of Staff				
Stat Lab	# of Staff				
Others:					

Form 2 (Contd.)

2.1 Section: Administration

2.2 Unit Operations	2.3 Activity Descriptor	2.4 Activity Level	2.5 Contact Person	2.6 Phone #	2.7 Room #
Admissions	1000 Patients				
Finance	# of Staff				
Health Services	# of Staff				
Human Resources	# of Staff				
Medical Info. System (MIS)	# of Staff				
Medical Records	# of Staff				
Library	# of Staff				
Locker Rooms	# of Staff				
Physicians: Offices Waiting Rooms	 # of Staff # of Staff				
Purchasing	# of Staff				
Residents' Lodging	# of Beds				
Others:					

Form 2 (Contd.)

2.1 Section: Support Services

2.2 Unit Operations	2.3 Activity Descriptor	2.4 Activity Level	2.5 Contact Person	2.6 Phone #	2.7 Room #
Coffee Shops	# of Staff				
Decontamination					
Dietetics Cafeteria Food Prep.	# of Meals				
Drug Store (Pharmacy)	# of Staff				
Dry Cleaning	# of Staff				
Engineering: Mechanical Physical Plant Electrical	 # of Staff # of Staff # of Staff				
Housekeeping	# of Staff				
Inventory Control	# of Staff				
Receiving/Warehouse	# of Staff				
Supply, Purchasing & Distribution (SPD)	# of Staff				
Telecommunication: Printing Communications	 # of Staff # of Staff				
Others (e.g. Store):					

2.1 Section: Miscellaneous

2.2 Unit Operations	2.3 Activity Descriptor	2.4 Activity Level	2.5 Contact Person	2.6 Phone #	2.7 Room #
Building Exterior					
Other Buildings					
Others:					

2. CURRENT WASTE DISPOSAL: IDENTIFYING THE WASTE TYPES

Hospitals are potential generators of several types of both hazardous and non-hazardous wastes. In order to determine what types of waste materials should be evaluated at your hospital, it is useful to identify the current waste disposal quantities of the different waste types. The following forms will assist you in identifying the quantities of the separate waste types that your facility is currently generating:

Form 3	General Wastes
Form 4	Confidential Shredded Waste Disposed Off-site
Form 5	Biomedical Waste
Form 6	Liquid and Chemical Wastes Registered for Off-site Secure Disposal
Form 7	Radioactive Waste Registered for Off-site Secure Disposal
Form 8	Pharmaceutical Wastes

In conducting this part of the evaluation, you will be visiting or interviewing several individuals from various sections in the hospital. Information that you obtain should be available from records, manifests, waste haulers or estimates. No actual measurements should be required. You may wish to combine the form questionnaires so that several answers are obtained with one visit. Attach copies of waste disposal records, where available, to the appropriate forms, and record the name and address of the waste hauler contracted. Where more than one waste hauling company is used, make photocopies and fill out a separate form for each. These forms establish a record of number, type and sizes of bins used by each hauler, and can be used to help eliminate bins when waste is reduced or consolidated for recycling purposes.

This section does not include wastes that are currently sewered or released to the atmosphere. These wastes are discussed in Part B, Section 3.3

2.1 Form 3: General Wastes

General waste constitutes the greatest portion of the waste disposed at a hospital. This includes waste materials that are commonly disposed of at home, i.e. paper products, food wastes and their containers, and diapers, and many have a good potential for reuse or recycling initiatives. This general waste option, however, may also include pretreated infectious, non-anatomical biomedical wastes such as microbiology laboratory waste or waste sharps. These pretreated biomedical wastes are generally too contaminated with residuals such as human body wastes (i.e. blood, urine, etc.) or testing substances (such as agar from microbiology) to be currently accepted for recycling or reuse. As a result, "Clean General Waste" is the quantity of general wastes which do not contain pretreated biomedical wastes and from which a good portion of waste material may be suitable for waste recycling or reuse.

In this section, the total quantity of general wastes disposed at your facility is to be reported. This type of waste material is commonly disposed of at municipal landfill sites or, in some cases, incinerated along with biomedical wastes. If the waste is disposed of at a landfill site, the quantity of waste disposed can be readily obtained by reviewing waste disposal records from hospital services (housekeeping or services and material management) or from your waste hauler. If waste quantities are not given, you can estimate the weight of the waste after identifying the type and size of container and obtaining a weight estimate from your waste hauler for that type of container, as indicated on Form 3 under the Container Section. If the waste is incinerated, you may have records on-site that will identify the quantity of waste burned. If this information is not available, you may have to estimate the number and weight of bags for a short operating period (e.g. 1 week) to obtain an estimate. Note that incineration of general wastes may be discouraged in some provinces. Contact your provincial Ministry of the Environment to determine what the policy is in your province. Attach copies of disposal contracts where available. Do not report waste quantities currently recycled or reused off-site here but report these in Form 9.

Supporting information for Form 3:

3.1 List the types of waste containers that are currently used at your hospital. If you can identify the use of waste bins which are required infrequently for special projects, list them as well. If there are dedicated bins for certain areas (i.e. cafeteria or engineering), note where they are located.

3.2 Record the size of the container(s) in cubic yards.

3.3 Record the number of containers for each type of bin.

3.4 Record the number of collections of waste in a week, month or year. Convert all values to pick-ups per year (e.g. 1 pick-up per week = 52 pick-ups per year). You should confirm that this figure is representative of the year by quickly reviewing sample disposal weights from each of the 4 seasons of the year.

3.5 Record the average % fill of the containers when they are emptied. Obtain estimates from housekeeping staff.

3.6 Record the average weight of general waste disposed to landfill per year in kilograms, as obtained from disposal records or your waste hauler. This number can also be calculated based on your waste hauler's estimate of the weight of waste in each container, multiplied by the number of full containers disposed of. If your waste hauler cannot give you an average estimate, refer to Appendix 3 on Waste Conversion Factors to obtain average figures of waste for typical containers, e.g.

Hospital A has 2 - 4 yd^3 dumpsters emptied 5 times per month, which are 3/4 filled

$\therefore$ 2 x 4 = 8 yd^3 dumped per time

8 yd^3 x 3/4 filled x 5/month = 30 yd^3/month disposed

Hauler estimate of waste weight:

1 yd^3 = 250 lbs/yd^3

$\therefore$ Total weight of waste disposed is:

30 yd^3/month x 250 lbs/yd^3 x 12 months/year = 90,000 lbs/year

or,

90,000 lbs/year ÷ 2.2 lbs/kg = 40,909 kg/year

3.7 Record the total weight of general waste disposed of by incineration per week, month or year in tonnes. Convert these values to total waste disposed of per year. Where records are not available, obtain estimates from Housekeeping or the operator of the incinerator. Be sure to record only the weight of waste which is considered general waste.

3.8 Record the total weight of waste disposed of as listed in Lines 3.6 or 3.7 into this column. Convert all figures to tonnes per year value.

3.9 Add all the total waste values recorded in the column of Line 3.8. This will give you a total value of general waste disposed per year. Do not forget to include any other values from other sheets that you may have used that list quantities disposed of by separate hauling companies.

3.10 Calculate the total for pretreated, infectious, non-anatomical wastes which can be obtained from Form 5, Lines 5.1 and 5.2 Insert the sum of these two lines here.

3.11 Report the value you obtain when you subtract Line 3.10 from Line 3.9. This will give you the total quantity of clean general waste disposed, excluding the pretreated, infectious, non-anatomical wastes.

After completing this form, you will have identified the total quantity of general waste disposed by your hospital. Also, by knowing the type, size, and % fill of waste containers, you will be able to estimate, later in this assessment, whether you can incur cost savings in waste disposal. For example, if you currently contract for a waste disposal bin that is picked up when it is only 50% filled, and you reduce your total waste by reduction, reuse or recycling initiatives, you may be able to save disposal costs by: (a) contracting for a smaller bin; (b) delaying pick-up of waste; (c) eliminating a waste bin if more than one is used.

In Part B of this Manual, you will be able to predict what types of waste materials are being generated by your hospital and from what areas you may expect to find them. This will allow you to identify materials which could be included in waste reduction, reuse or recycling initiatives, which is discussed in Part C.

FORM 3 - CURRENT WASTE DISPOSAL:

GENERAL WASTE

Name and Address of Hauler:

Containers					3.6 Wt of Waste Disposed to Landfill kg/yr	3.7 General Waste Disposed by Incineration kg/yr	3.8 Total Wt Disposed tonnes/yr
3.1 Disposal Type	3.2 Size (yds^3)	3.3 #	3.4 Collections/ yr	3.5 % Filled When Collected			
Compactors							
Roll-Offs							
Dumpsters							
Other: (describe)							
Other Infrequently Disposed General Solid Waste							
Construction/ Demolition							
Ash from On-site Incineration (see 5.13)							
Landscaping Waste							
Maintenance							
Other							

Total General Waste (Total of 3.8 entries) 3.9 _____ Tonnes/yr

Subtract Pretreated Infectious Non Anatomical Waste (from Form 5 lines 5.3 & 5.4) 3.10 _____ Tonnes/yr

Total Clean General Waste (excluding Pretreated, Infectious, Non Anatomical Waste) 3.11 _____ Tonnes/yr

NOTE: A separate form should be filled out for each hauler contracted, so that, when waste is reduced, bins can be eliminated.

2.2 Form 4: Confidential Shredded Waste Disposed Off-site

In this section, the quantity of confidential shredded waste which is generated by your facility and disposed of off-site by a contracted company, will be identified. Obtain this information from hospital purchasing records or contact the shredding company directly. If your hospital destroys all of its own records by on-site shredding or incineration, then this total will be included in Form 3 as part of General Waste. Note this on Form 4, but do not complete the rest of the form. Attach copies of disposal contracts, where available.

If you know the total weight of paper shredded per visit, go directly to 4.4, otherwise proceed with 4.1.

Supporting information for Form 4:

4.1 List how frequently the shredding company visits your hospital for record destruction, in number of visits per year.

4.2 Record the number of hours the contracted company spends shredding the records, in number of hours per year.

4.3 Obtain, from the shredding company, the total quantity of records that they shred, in kg per hour.

4.4 Estimate the total quantity of shredded paper disposed of off-site by your contractor by multiplying the total number of hours spent on-site per year (line 4.2) by the average quantity of records destroyed per hour (line 4.3). This will give you a value of kg per year, e.g.

Hospital A contracts confidential shredder company.
Shredder shreds 300 kg/hr.
Contractor comes 3x per year, total of 25 hrs.

∴ Total confidential shredded waste = 300 kg/hr x 25 hrs/yr
= 7,500 kg/yr
or = 7.5 tonnes/yr

4.5 Total all numbers from section 4.4, Form 4. Report the total of all confidential shredded waste disposed of off-site and convert to tonnes per year.

By completing this form, you will have identified the total quantity of confidential shredded records that are being disposed of by your shredding contractor from your hospital. In Part C of this Manual, you can identify possible waste reduction or recycling initiatives for this waste type.

FORM 4 - CURRENT WASTE DISPOSAL:

CONFIDENTIAL SHREDDED WASTE DISPOSED OFF-SITE

Name of Contracted Shredding Company:
Address:

4.1 Frequency of Visits/year	4.2 Total No. of Hours Spent Shredding/ year	4.3 Average Weight Processed (kg/hour)	4.4 Weight of Waste Disposed via Contractor to Landfill (kg/year)

Total Quantity of Confidential Shredded Waste Disposed of Off-site/year: 4.5_____Tonnes/yr

2.3 Form 5: Biomedical Waste

In this section, the quantity of biomedical waste generated by your hospital will be reported. Please refer to the Guidelines for the Management of Biomedical Waste in Canada (see references) to make sure you understand how these wastes should be collected, handled, stored and disposed. Also, contact your provincial Ministry of the Environment for current provincial Biomedical Waste Legislation information.

Obtain information on biomedical waste quantities from disposal records, if they are available. If your infectious, non-anatomical biomedical waste has been pretreated on-site by an approved method such as autoclaving, it may be disposed of with your general wastes by the same hauler listed in Form 3. It may also be hauled and disposed of by incineration by a contracted waste hauler, or incinerated on-site by your own hospital. Small quantities of blood and body fluids may also be disposed of to the hospital sewage system, after any infection potential has been eliminated (i.e. by autoclaving). Check with your local municipal authorities for specific regulations in your area.

Records for off-site disposal of biomedical waste may be found from sections such as housekeeping, purchasing, material management, etc. You may also obtain some information from your waste disposal company. If on-site incineration is used, determine the quantities by contacting the appropriate department at your facility (e.g. housekeeping or engineering). Some hospitals may use more than one mode of disposal for their biomedical wastes, depending on the availability of these services. It is important to include all the different types of disposal routes used during the year to obtain the total quantity disposed. Attach copies of contracts where available, and note the name and address of the waste hauler, if one is used.

Types of biomedical waste that will be included in this part of the evaluation are Infectious, Non-anatomical (i.e. Sharps, Microbiology Laboratory Wastes, and Blood and Body Fluids) and Human Anatomical wastes. Check that your hospital characterizes its wastes in this way.

Supporting information for Form 5:

5.1 Record the quantity of autoclaved biomedical wastes generated by your hospital in kg per year. Records may be obtained from the department that operates the autoclave for waste treatment purposes, e.g. housekeeping, supply purchasing and distribution, and engineering. If no actual weights are available, you can estimate the average weight of containers from discussions with housekeeping staff and multiply this by the number of containers and bags autoclaved, or purchased throughout the year.

5.2 Record the quantities of these biomedical wastes undergoing on-site pretreatment, other than autoclaving (i.e. microwaving) in kg per year. Contact the department that conducts this procedure for waste quantity totals or estimates. Contact your local Ministry of the Environment to make sure this is an approved practice. Remember to record landfilled, pretreated, infectious non-anatomical wastes in Form 3, Section 3.10.

5.3 Record the quantities of these biomedical wastes incinerated on-site in your own facility in kg per year. Obtain estimates from housekeeping where the weight is not known, as in Section 5.1.

5.4 Record the total quantities of these biomedical wastes incinerated off-site in another public facility in kg per year. Records should be available from your waste hauler and your manifest forms. If you cannot distinguish between these biomedical wastes and anatomical wastes from your records, obtain an estimate from housekeeping staff.

5.5 Record the total quantities of these biomedical wastes incinerated off-site in a commercial facility in kg per year. Records should be available from your waste hauler and your manifest forms. Contact your housekeeping staff for this information.

5.6 Combine the totals from sections 5.1 to 5.5 (inclusive) to obtain the total quantity of infectious, non-anatomical biomedical waste generated at your facility and convert this number to tonnes per year.

5.7 Record the total quantities of anatomical wastes incinerated on-site in kg per year. Records may be available from the hospital section performing this function, or you may have to obtain estimates from them.

5.8 Record the total quantities of anatomical wastes incinerated off-site at a public facility in kg per year (e.g. another local hospital).

5.9 Record the total quantities of anatomical wastes incinerated off-site at a commercial facility in kg per year.

5.10 Combine the quantities of wastes disposed in sections 5.7, 5.8 and 5.9. Report the total human anatomical waste generated by your facility in this section and convert to tonnes per year.

5.11 Combine the totals from sections 5.6 and 5.10, and report the total biomedical waste disposed of by your facility in tonnes per year.

5.12 Where on-site incineration is used, report where the ash is disposed (e.g. Municipal landfill).

5.13 Where on-site incineration is used, report the quantity of ash disposed of in kg per year. Obtain estimates from housekeeping or engineering on frequency of chamber clean-out, number of bags of ash disposed of and average weight of the bags to provide a weight estimate (i.e. # bags per clean-out x # clean-outs per year x average weight of bags in kg = kg of ash disposed of per year). If disposed at a municipal landfill site, remember to report this figure in Form 3, Section 3.1.

By completing this section, you will have identified the total quantity of biomedical waste generated by your facility. If your facility is generating more than the average of 5-10% of its total waste as Biomedical waste, you may wish to review your handling and segregation procedures to make sure that only waste designated as Biomedical (as per provincial regulations and federal guidelines) is being disposed of in this manner. This may help to reduce some of your Biomedical waste disposal costs.

FORM 5 - CURRENT WASTE DISPOSAL:

BIOMEDICAL WASTE

Waste Type: Infectious, Non Anatomical, including Sharps, Microbiology Waste, and Blood & Body Fluids

Name of Hauler:
Address:

5.1 Autoclaved On-Site and Landfilled (kg/yr)	5.2 Waste Subject to Other On-Site Treatment (list) and Landfilled (kg/yr)	5.3 Incinerated On-Site (kg/yr)	5.4 Incinerated Off-Site (Public Facility) (kg/yr)	5.5 Incinerated Off-Site (commercial facility) (kg/yr)	5.6 Total Waste Disposed (tonnes/yr)

Waste Type: Human Anatomical Waste

Name of Hauler:
Address:

5.7 Incinerated On-Site (kg/yr)	5.8 Incinerated Off-Site (public facility) (kg/yr)	5.9 Incinerated Off-site (commercial facility) (kg/yr)	5.10 Total Waste Disposed (tonnes/yr)

Total Biomedical Waste Disposed 5.11 _____Tonnes/yr
Ash Disposal from On-site Incineration 5.12 Disposal Destination _____
5.13 Quantity _____kg/yr

2.4 Form 6: Liquid and Chemical Wastes Registered for Off-site Secure Disposal

In this section, the quantities of liquid and chemical wastes currently registered for off-site secure disposal by your facility will be reported. Hazardous liquid and chemical waste disposal requirements can be obtained from your provincial Ministry of the Environment.

Obtain this information from disposal records which may be kept with housekeeping, engineering or environmental control personnel, or by contacting your provincial Ministry of the Environment for Manifest information. Some liquid and/or chemical wastes may be currently sent for recycle, or reused on-site. Do not report material recycled or reused off-site here, but report it in Form 11. Attach copies of disposal records, where available, and report the name and address of your waste hauler, with separate copies of Form 6 for each hauling company used.

Supporting information for Form 6:

6.1 Identify the type of waste material disposed of (e.g. toluene, as solvent waste).

6.2 List the types of disposal containers used to dispose of this waste (e.g. metal drums, plastic drums, tanker loads, etc.) and the sizes in litres (e.g. 205 L drums).

6.3 Report the numbers of these containers disposed per year.

6.4 Estimate the average weight, in kg, of a full container of this waste type. This can be done by noting the average specific gravity for the product, which can be obtained from chemical information data sheets for the material. Calculate the average weight, e.g. for toluene, as follows:

1 full drum of toluene = 205 L

Density of toluene (from material safety data sheet on drum) = 0.866 kg/L

∴ Weight of 1 drum of toluene = 205 L x 0.866 kg/L = 177.5 kg

6.5 Report the average % fill of the disposed containers, (e.g. 3/4 full when picked up).

6.6 Report the total weight of this waste disposed of by your facility over the past year in kg per year. This total can be calculated from the information recorded in section 6.2 to 6.6. For example:

Hospital A has 2 drums of toluene, 3/4 full, disposed per year

∴ 2 drums toluene/yr x 177 kg/drum x 3/4 = 266 kg/yr.

6.7 Combine all the totals of the different waste types recorded in section 6.8 and report the total quantities of liquid and chemical wastes registered for off-site secure disposal in tonnes per year.

By completing this section, you will have identified the total quantity of liquid and chemical waste that is generated by your facility for off-site secure disposal.

In Part B of this Manual, you will be able to identify other liquid and chemical wastes potentially generated at your facility. By identifying the use and disposal route of other liquid and chemical materials used at your facility, and understanding your provincial or municipal disposal restrictions, you can determine if your hospital is in compliance with all regulations regarding disposal of particular waste materials.

In Part C of this Manual, you will be able to address waste reduction, reuse and recycling initiatives for wastes generated in this category.

FORM 6 - CURRENT WASTE DISPOSAL:

LIQUID AND CHEMICAL WASTE REGISTERED FOR OFF SITE SECURE DISPOSAL

Name of Hauler:
Address:

6.1 Material Type	6.2 Type & Size of Container (L)	6.3 # of Containers/yr	6.4 Average Wt. of full container (kg)	6.5 % Filled when when Collected	6.6 Total Wt. of Waste (kg/yr)

Total Quantity of Liquid and Chemical Waste Registered for Off-Site Secure Disposal: 6.7_____tonnes/yr

2.5 Form 7: Radioactive Waste Registered for Off-site Secure Disposal

In this section, the quantity of radioactive waste generated by your facility for off-site secure disposal will be reported. The disposal of this waste material is regulated by Atomic Energy Control Board (Federal Government).

Obtain this information from the Radiation Safety Officer designated for your facility. This type of position is generally found in Nuclear Medicine, or other sections that may be dealing with radioactive materials for research or patient use. Many hospitals use low level radiologicals that may be stored on-site for a suitable length of time and then discarded with other similar waste streams (i.e. solids with general wastes and liquids potentially sewered). Report only those wastes that require secure disposal off-site. Attach copies of disposal contracts, where available, and note the name and address of the company disposing of your wastes.

Supporting information for Form 7:

7.1 Identify the radioisotope material disposed.

7.2 Note the number of times per year that the disposal company is contracted to pick up radioactive waste materials. Where this frequency is less than once per year, record the frequency as best as you can (i.e. 1 per 2 years).

7.3 Record the number of containers picked up per visit by the disposal company, if known.

7.4 Record the average weight of the container picked up for disposal (e.g. < 2 kg).

7.5 Calculate the total weight of waste disposed in kg/yr for the period noted in 7.2.

7.6 Add all the values you have recorded in 7.5 and report the value in weight in tonnes disposed of per year.

By completing this form, you will have identified the total quantity of radioactive waste generated by your facility for off-site secure disposal.

In Part B of this Manual, you will be able to see what other types of radioactive materials, which do not require secure disposal, could be used and disposed of at your facility.

In Part C, potential waste minimization initiatives will be presented for this waste type. Waste reduction initiatives (e.g. packaging waste reduction) may be the most appropriate waste minimization option for this type of waste.

FORM 7 - CURRENT WASTE DISPOSAL:

RADIOACTIVE WASTE REGISTERED FOR OFF SITE SECURE DISPOSAL

Name of Disposal Company:
Address:

7.1 Material Type	7.2 Frequency of Disposal	7.3 Number of Containers	7.4 Average Weight of Container	7.5 Total Weight (kg/yr)

Total Radioactive Waste Disposed Off-site in Secure Disposal Site 7.6_____tonnes/yr

2.6 Form 8: Pharmaceutical Waste Requiring Secure Disposal

In this section, the quantity of pharmaceutical waste generated by your facility for off-site secure disposal will be reported. Included in this section are wastes such as cytotoxic waste materials from patient administration and any other kinds of pharmaceutical wastes in the form of prescription drugs such as narcotics, and off-spec and outdated drugs from the pharmacy. The suggested disposal procedure for cytotoxic wastes are described in the Guidelines for the Management of Biomedical Waste in Canada.

Information on disposal of cytotoxic wastes can be obtained from disposal records if this waste is disposed of with biomedical wastes and if this information is recorded separately. Narcotic and prescription drug disposal information might be obtained from pharmacy representatives. Obtain estimates from pharmacy staff if information is not readily available. In most hospitals, these quantities are not well known. Attach copies of waste disposal contracts where available, and note the name and address of the waste hauler, if appropriate.

Supporting information for Form 8:

8.1 Identify the type of pharmaceutical waste material disposed (e.g. cytotoxic, narcotic, prescription drugs, etc.).

8.2 Report the quantity of this waste which is treated/disposed on-site, in kg per year and list the type of treatment and disposal. On-site chemical pretreatment may be used for specific cytotoxic drugs (see Guidelines for the Management of Biomedical Waste in Canada). Contact your provincial Ministry of the Environment for accepted procedures.

8.3 Report the total quantity of this waste incinerated on-site, in kg per year. Records may be available from the section in the hospital responsible for operation of the incinerator (engineering or housekeeping) or from the people who collect the waste for disposal (housekeeping).

8.4 Report the total quantity of this waste disposed off-site at a public incinerator (e.g. local hospital), in kg per year. The receiving incinerator may have some records available, or you may have this information recorded from manifesting this waste. Check with housekeeping for any records they may have.

8.5 Report the total quantity of this disposed material off-site at a commercial incinerator, in kg per year. Total quantities may be available from waste manifest information from your facility (i.e. housekeeping) or from your waste hauler.

8.6 Report the total quantity of this waste disposed off-site at a secure disposal site other than an incinerator (e.g. secure landfill), in kg per year. This total quantity may be available from waste manifest records, and could apply to non cytotoxic wastes.

8.7 Report the total quantity of pharmaceutical waste disposed of by adding up the totals of waste quantities reported in Sections 8.2, 8.3, 8.4, 8.5, and 8.6. Report the value in kg per year.

8.8 Add up all the values you have recorded in Section 8.7 and report the total in tonnes per year.

By completing this form you will have identified the total quantity of pharmaceutical waste generated by your facility that is currently requiring secure treatment and disposal.

In Part C of the Manual, you can identify potential waste minimization initiatives.

FORM 8 - CURRENT WASTE DISPOSAL:

PHARMACEUTICAL WASTE REQUIRING SECURE DISPOSAL

Name of Hauler:
Address:

8.1 Material Type	8.2 On-Site Treatment/ Disposal (list) (kg/yr)	8.3 Incinerated On-Site (kg/yr)	8.4 Incinerated Off-Site (public facility) (kg/yr)	8.5 Incinerated Off-Site (commercial facility) (kg/yr)	8.6 Other Off-Site Secure Disposal (kg/yr)	8.7 Total Waste (kg/yr)

Total Pharmaceutical Waste Requiring Secure Disposal 8.8_____Tonnes/yr

3. IDENTIFY MATERIALS CURRENTLY RECYCLED OR REUSED OFF-SITE

In this section, the quantities of waste materials which are currently sent for off-site recycle or reuse will be reported in each of the categories, as appropriate, as identified in Section 2. Many hospitals already recycle materials because it makes economic sense, for example, silver recovery from X-ray developing solutions. In other cases, recycling may be regulated, which is the case with some municipalities who are imposing material bans at landfill sites. Materials that may be banned from landfill include cardboard, tires, wood waste, drywall from construction projects, paper, plastic, white goods, 'blue box' materials such as glass containers, cans and newspaper. Contact your municipal or regional public works department to find out which local policies may affect your hospital. In some provinces, provincial legislation may soon be passed that could also restrict disposal of certain waste materials. Contact your provincial Ministry of the Environment to find out how their waste management policies may affect your hospital's disposal practices. Make a list of these waste materials which are required to be recycled or reused off-site.

3.1 Form 9: General Wastes
Form 10: Confidential Wastes
Form 11: Liquid and Chemical Wastes
Form 12: Other Wastes

These forms will help you identify the materials currently being recycled or reused off-site from different sections within the hospital. They will help you consolidate the information about markets for waste materials and the total quantity of these materials recycled/reused from your facility.

Details to keep in mind when completing these forms are:

- Confidential wastes could be currently recycled by your shredding contractor or could be included with totals for your on-site paper recycling programs.
- Some liquid and chemical waste may be hazardous and cannot be disposed of to landfill or the sewer system. For sewer use by-laws, contact your local municipality, and contact your provincial Ministry of the Environment for information on hazardous waste disposal regulations.
- Other waste materials may include exceptional practices such as recycling of biomedical waste components, radiologicals and pharmaceuticals.

Supporting information for Forms 9, 10, 11 and 12:

(9.1 Identify the material type that is currently being recycled or reused
(10.1 off-site.
(11.1 • For confidential wastes, identify the grade of paper (e.g.
(12.1 carbon paper, computer print-out)
• For liquid and chemical wastes, list the chemical name (e.g. toluene, xylene).

(9.2 Identify the location within your hospital where the recycle or reuse
(10.2 activity is taking place.
(11.2 • For Forms 9, 11 and 12, use categories from Form 2 to
(12.2 make sure you cover all areas within your facility
• Confidential paper is often collected throughout the building for storage until the shredding contractor arrives. In this case, it may not be important to identify each individual area. Separate areas could be noted

where paper is shredded on-site on a regular basis by a hospital shredder and added to paper recycling programs set up for office paper

(9.3 Identify the recycler or receiver of the waste material in each case.
(10.3 This could be a recycling company, a recipient found via a Waste
(11.3 Exchange, or a contract shredding company as in confidential
(12.3 paper. You may wish to note the phone number of this contact for your own records.

(9.4 Report the date on which this recycling initiative first began.
(10.4 Contact the individual who initiated this project, or the recycler. If
(11.4 this is impossible, report the information as an estimate.
(12.4

(9.5 Report the weight of the material recycled as best you can, in kg
(10.5 or litres per year. To obtain this information, contact as in 9.4,
(11.5 10.4, 11.4, 12.4.
(12.5

(9.6 Report the total quantity recycled or reused off-site by your facility
(10.6 in tonnes per year by adding all figures reported in 9.5, 10.5, 11.5,
(11.6 12.5.
(12.6

When completed, these forms in Section 3 will be your checklist of all materials generated by your hospital which are currently being recycled and/or reused off-site.

FORM 9 - IDENTIFYING MATERIALS CURRENTLY RECYCLED AND REUSED OFF-SITE:

GENERAL WASTE

9.1 Material Type	9.2 Location of Activity	9.3 Recycler	9.4 Date Recycling Began	9.5 Weight of Recycled Material (kg/yr)

Total Clean General Wastes Recycled/Reused Off-site 9.6_____Tonnes/yr

FORM 10 - IDENTIFYING MATERIALS CURRENTLY RECYCLED AND REUSED OFF-SITE:

CONFIDENTIAL WASTE

10.1 Material Type	10.2 Location of Activity	10.3 Recycler	10.4 Date Recycling Began	10.5 Weight of Recycled Material (kg/yr)

Total Confidential Wastes Recycled/Reused Off-site 10.6_____Tonnes/yr

FORM 11 - IDENTIFYING MATERIALS CURRENTLY RECYCLED AND REUSED OFF-SITE:

LIQUID AND CHEMICAL WASTES

11.1 Material Type	11.2 Location of Activity	11.3 Recycler	11.4 Date Recycling Began	11.5 Weight of Recycled Materials kg/yr

Total Liquid and Chemical Wastes Recycled/Reused Off-site 11.6_____Tonnes/yr

FORM 12 - IDENTIFYING MATERIALS CURRENTLY RECYCLED AND REUSED OFF-SITE:

OTHER WASTES

12.1 Material Type	12.2 Location of Activity	12.3 Recycler	12.4 Date Recycling Began	12.5 Weight of Recycled Materials kg/year

Total Other Wastes Recycled/Reused Off-site 12.6_____Tonnes/yr

4. IDENTIFYING CURRENT ON-SITE REDUCTION AND REUSE ACTIVITIES

In this section, hospital activities which contribute to waste reduction and reuse on-site will be reported. These activities are generally the most important ones because they actually prevent the waste from being produced in the first place. The actual quantities of waste materials that may be displaced as a result of these initiatives may be significant, but could be difficult to validate. Therefore, you could attempt to make estimates on total quantities of wasted materials these processes save, but do not total these figures.

The reuse of medical devices, which have been manufactured as single use items, has been a controversial issue for some time. Contact Health and Welfare Canada to determine whether the practice at your hospital falls within their guidelines.

4.1 Form 13: General Wastes
Form 14: Liquid and Chemical Wastes
Form 15: Other Wastes

These forms will help identify the current on-site waste reduction and reuse activities in the General Waste Stream (Form 13), the Liquid and Chemical Waste Stream (Form 14), and Other Wastes such as Confidential, Biomedical, Radiological and Pharmaceutical (Form 15). The activities included may be any operation which results in less waste being produced in this category.

Supporting information for Forms 13, 14 and 15:

(13.1 Report the material being reused or the activity resulting in less
(14.1 waste being produced, in this waste category. Attempt to estimate
(15.1 the quantity of waste material that is **not** produced by performing this activity, in tonnes per year (i.e. for General Wastes: reuse and resterilization of durable containers for surgical implements; for Liquid and Chemical Wastes: on-site distillation and reuse of solvents; for Other Wastes: the use of electronic information systems that replace confidential waste generation).

(13.2 Identify the locations of the activities being described. Use Form 2
(14.2 to make sure you have surveyed all sections within your hospital.
(15.2

By completing this section, you will have identified the types of activities taking place in your hospital that contribute to on-site waste reduction and reuse.

FORM 13 - IDENTIFYING CURRENT ON-SITE WASTE REDUCTION AND REUSE ACTIVITIES:

GENERAL WASTES

13.1 Material/Activity	13.2 Location of activity

FORM 14 - IDENTIFYING CURRENT ON-SITE WASTE REDUCTION AND REUSE ACTIVITIES:

LIQUID AND CHEMICAL WASTES

14.1 Material/Activity	14.2 Location of activity

FORM 15 - IDENTIFYING CURRENT ON-SITE WASTE REDUCTION AND REUSE ACTIVITIES:

OTHER WASTES

15.1 Material/Activity	15.2 Location of activity

5. CONSOLIDATING YOUR RESULTS

It is useful to consolidate your hospital's waste data so that these can be evaluated by your Environmental Committee and made available to interested persons in your hospital, and used as a reference tool to proceed to Parts B and C. This information will be useful in detailing a waste reduction plan and should be presented in an easy to understand format, containing all the appropriate information. Use Form 16 presented in this section to consolidate the results of your waste assessment. Obtain all the information required by extracting it from the appropriate Forms already completed in the previous sections. If you bypassed Part A (Sections 1 to 4), then use information your hospital has already collected to complete this form. You may wish to illustrate the waste quantities generated by drawing a pie chart which will help visually identify the large waste quantities. If you have difficulty with any of the requirements, please refer to the form number referenced for more information.

Calculate the total waste generated for each material type by adding waste materials currently disposed of and those same waste material types currently recycled or reused off-site. Calculate the percentage of waste material that is recycled or reused off-site from the total waste generated by your facility, keeping in mind that waste reduction goals of 25% by 1992 and 50% by the year 2000 will be your targets. This target could also be reached by incorporating your waste reduction and reuse initiatives on-site, if you can validate your on-site reduction estimates and these initiatives were not in place before 1988. (The waste reduction targets are with respect to a baseline quantity established for 1988).

FORM 16 - SUMMARY OF TOTAL WASTE DISPOSED, RECYCLED & REUSED OFF-SITE BY WASTE TYPES

	Waste Material Type							
	Clean General Waste tonnes/yr	Confidential Waste tonnes/yr	Biomedical Waste tonnes/yr	Registrable Liquid & Chemical Waste tonnes/yr	Radioactive Waste tonnes/yr	Pharmaceutical Waste tonnes/yr	Total	
							Tonnes/yr	%
Total Waste Disposed	Form 3 Line 3.11	Form 4 Line 4.5	Form 5 Line 5.11	Form 6 Line 6.7	Form 7 Line 7.6	Form 8 Line 8.8		
Total Quantity Recycled & Reused Off-site	Form 9 Line 9.6	Form 10 Line 10.6	Form 12	Form 11 Line 11.6	Form 12	Form 12		
Total Waste Disposed Off-site								100

6. ESTIMATING CURRENT WASTE MANAGEMENT COSTS

Current costs for waste handling and disposal need to be determined so that you can understand how costs for some waste minimization initiatives would compare. In many hospitals, the cost of biomedical waste disposal has been by far the highest component of the total waste disposal costs. In some areas, however, general waste disposal costs have skyrocketed and now represent a significant cost to hospitals.

In Form 17, the waste costs have been divided into capital and operating and maintenance (O/M) costs for each waste and disposal option that is found in average hospital use. Determine, as accurately as possible, the costs for your facility. Actual disposal costs can be obtained from your purchasing department or from your contracted waste hauler. Other figures, such as capital equipment costs or portion of labour costs, will be more difficult to obtain and may have to be estimated by the appropriate staff and with help from Services and Material Management personnel. This information will be required to make accurate predictions of financial implications of various 3Rs' initiatives at your facility (Section C.1.1.7).

FORM 17 - ESTIMATING CURRENT WASTE MANAGEMENT COSTS

General Wastes	Costs/Year
Landfill Disposal	
Capital Costs: Housekeeping, Office, Storage Areas Garbage Room Other: Estimated Costs	
Operation & Maintenance (O/M): Disposal: Waste Disposal Transport of Waste Lift Fee Bin Rental Maintenance of Bins Labour: Housekeeping Materials: Garbage Bags Utilities (e.g. garbage room, power and water) Maintenance Items (e.g. soaps, cleansers) Other: Estimated Costs	
Estimated Total Cost	

Form 17 (Contd.)

Confidential Shredded Waste	Costs/Year
On-site Shredding - Landfill	
Capital Costs: Shredder O/M: Disposal: Portion of disposal costs Labour: Labour to operate shredder (% of total waste) Materials: Bags Estimated Costs	
Off-site Shredding - Landfill	
Capital Costs: Storage space in hospital for paper O/M: Disposal Cost of contractor and disposal Labour: Labour to transport paper to site (double handling) Materials: Utilities (power) Estimated Costs	
Estimated Total Cost	

Form 17 (Contd.)

Biomedical Waste: Infectious, non-anatomical	**Costs/Year**
On-site Pretreatment, i.e. Autoclaving - Landfill	
Capital Costs: Autoclave equipment Carts for collection Estimated Costs	
O/M: Disposal: Disposal costs (i.e. % of landfill or incineration costs) Labour: Labour to operate autoclave Materials: Maintenance/service (i.e. operating tests) Disposable Sharps containers Autoclavable bags Utilities (power, steam and water) Estimated Costs	
Estimated Total Cost	

Form 17 (Contd.)

Biomedical Waste: Anatomical/Cytotoxic	Costs/Year
Off-site Incineration (public facility)	
Capital Costs: Truck for transport (% of workload) Cold storage room costs Carts for collection Estimated Costs	
O/M: Disposal: Disposal costs Labour: Labour for pick-up Labour to transport Labour for maintenance of cold room Materials: Maintenance of truck/cold room Disposable bags Utilities (power, and water for cleaning) Estimated Costs	
Estimated Total Cost	

Form 17 (Contd.)

Biomedical Waste: Anatomical/Cytotoxic	Costs/Year
Off-site Incineration (commercial facility)	
Capital Costs: Cold storage room costs Carts for collection Estimated Costs	
O/M: Disposal: Transport fee Pick-up fee Disposal fee Labour: Labour for pick-up in hospital Labour to transport Labour for maintenance of cold room Materials: Maintenance of cold room Special cardboard containers Utilities (power for cold room) Estimated Costs	
Estimated Total Cost	

Form 17 (Contd.)

Biomedical Waste: Anatomical/Cytotoxic (contd.)	**Costs/Year**
On-site Incineration	
Capital Costs: Incinerator and scrubbing units Cold storage room costs Carts for collection Estimated Costs	
O/M: Disposal: Ash disposal costs Labour: Maintenance of incinerator Operation of incinerator Materials: Maintenance of incinerator and scrubbing units Utilities (power - electricity/gas, water for cleaning) Estimated Costs	
Estimated Total Cost	

Form 17 (Contd.)

Liquid and Chemical Wastes	Costs/Year
Off-site Secure Disposal	
Capital Costs: Chemical storage room costs Containers for collection Estimated Costs	
O/M: Disposal: Disposal costs Transportation fee Pick-up fee Labour: Maintenance of chemical storage room In-house pick-up Materials: Maintenance of chemical storage room Utilities (power for chemical storage room) Estimated Costs	
Estimated Total Cost	

Form 17 (Contd.)

Radioactive Wastes	Costs/Year
Off-site Secure Disposal	
Capital Costs: Storage/Decay facility Containers for decay Estimated Costs	
O/M: Disposal: Disposal costs Pick-up fee Labour: On-site monitoring Materials: Special containers Utilities Estimated Costs	
Estimated Total Cost	

In completing PART A, you will have identified:

(1) The services offered at your facility

(2) The waste types generated.

(3) The quantities of waste generated.

(4) The current waste reduction, reuse and recycle activities.

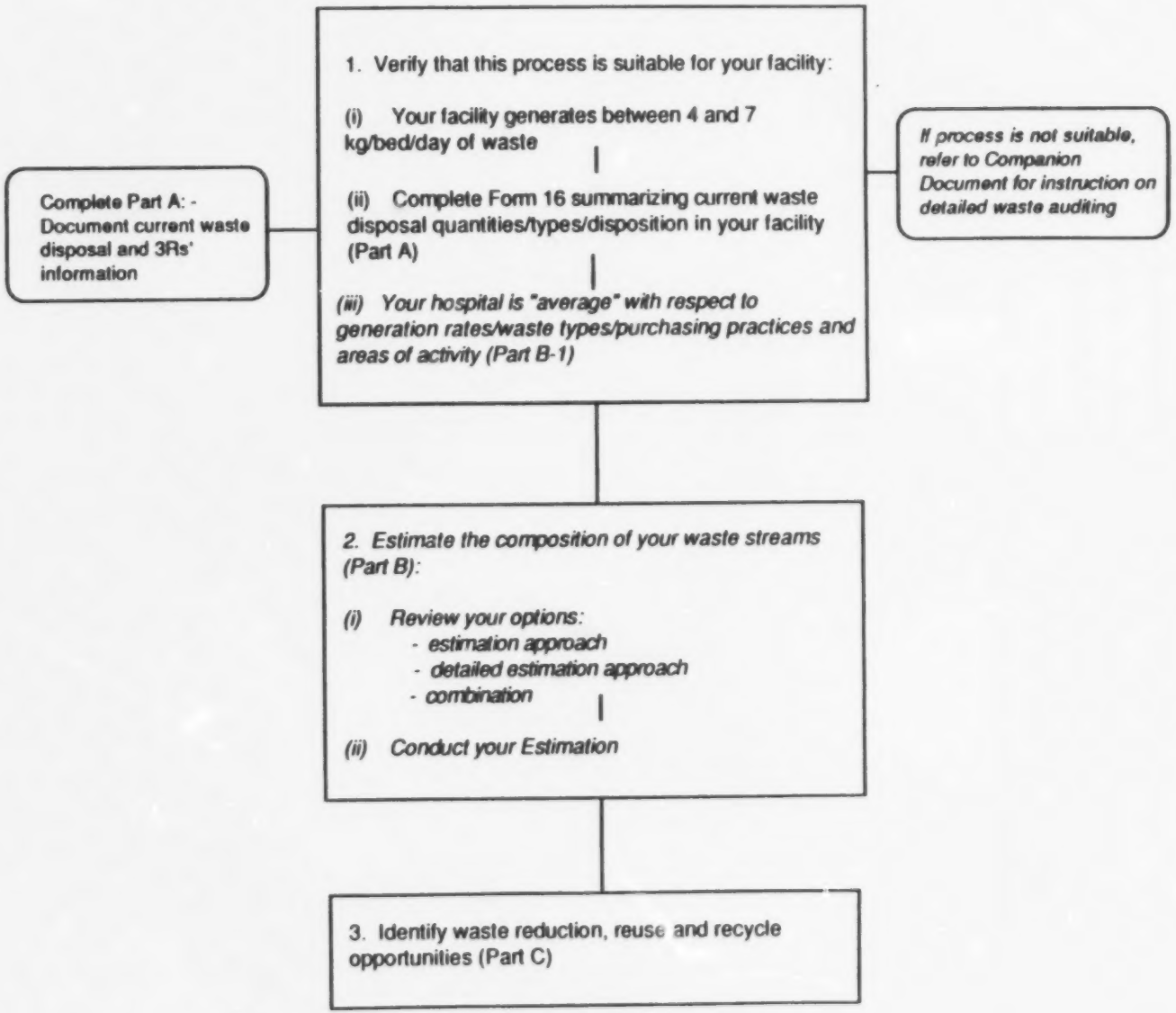
(5) The current waste disposal costs.

In order to evaluate additional cost effective waste reduction, reuse or recycling opportunities, you must identify the compositions of the different waste streams and where that waste is produced. This step will be covered in Part B.

PART B DETERMINING YOUR HOSPITAL WASTE COMPOSITION

This section will assist you in verifying whether the estimation approach is suitable for your hospital, outlining the various waste assessment options available to you, and applying these options to identify waste composition and locations of generation in your facility. The location of this section in the overall process is indicated in the Flowchart. Please complete Form 16 before proceeding with this section.

FLOWCHART: HOW THIS PROCESS IS ORGANIZED


1. Verify that this process is suitable for your facility:
(i) Your facility generates between 4 and 7 kg/bed/day of waste
(ii) Complete Form 16 summarizing current waste disposal quantities/types/disposition in your facility (Part A)
(iii) Your hospital is "average" with respect to generation rates/waste types/purchasing practices and areas of activity (Part B-1)
Complete Part A: - Document current waste disposal and 3Rs' information
If process is not suitable, refer to Companion Document for instruction on detailed waste auditing
2. Estimate the composition of your waste streams (Part B):
(i) Review your options:
- estimation approach
- detailed estimation approach
- combination
(ii) Conduct your Estimation
3. Identify waste reduction, reuse and recycle opportunities (Part C)

1. DETERMINING WHETHER YOU CAN USE THIS ESTIMATION APPROACH AT YOUR FACILITY

In order to implement waste reduction, reuse and recycling programs, you will need to know the composition of your waste. It will be necessary to identify specific material components, quantities, where and how these wastes are generated. In this section of the Waste Audit Manual, your hospital waste composition may be estimated without doing a detailed waste audit. This estimation approach was designed for use by "average" hospitals, i.e. those hospitals that perform the usual functions and activities and who purchase the types of materials currently found in most hospitals. Other facilities may either choose to use this approach, with caution, or can refer to the Companion Document which describes how to conduct a detailed waste audit.

In order to use this estimation approach, you must first determine whether your hospital is "average" by comparing your hospital to an "average" hospital by looking at:

(1) waste generation rates and waste types
(2) purchasing practices
(3) areas of activity within the hospital.

1.1 Form 18: Determining your Hospital Waste Types and Generation Rate Distribution

This form documents broad categories of waste types and quantities generated in your hospital. Its purpose is to facilitate a comparison with Table 1 data in the 'Using This Manual' section, so that you may verify that your hospital falls into the "average" range in its characteristics.

Supporting information for Form 18:

18.1 Record the waste quantity figures, already determined for your hospital, from Form 16, and other supporting forms and information referred to in Form 16.

18.2 Calculate the waste generation rates for each waste type in kg/bed/day. For example:

Hospital A has the following waste generation quantities:

Total waste generation	= 1,216.8 tonnes/year (Form 16)
Infectious non-anatomical waste	= 58.0 tonnes per year (Form 5, or your own records)
Total # active beds	= 529 beds (Form 1, or your own records)
% Occupancy	= 93% (Form 1, or your own records)

The waste generation rate of Infectious non-anatomical waste is:

58 tonnes/yr x 1000 kg/tonne ÷ 365 days/yr ÷ 529 beds x 93/100% OCC.
= 0.28 kg/bed/day

18.3 Record the percentage distribution of these different waste streams in your hospital. For example:

At Hospital A

% of Infectious non-anatomical waste is:

58 tonnes/yr ÷ 1,216.8 tonnes/yr total waste x 100% = 4.8%

After you have finished these calculations, you can determine whether your facility is average with respect to the distribution of the different waste types and waste generation rate by comparing your values to those presented in Table 1. If your total waste generation value does not fall within the 4-7 kg/bed/day

range, as mentioned in 'Using This Manual',then you should be aware that the estimation approach, which is suggested in this document, may not be representative of your hospital's waste. You may choose either to use this estimation approach with caution, or refer to the Companion Document for further guidance and descriptions of alternative waste audit approaches. If you hospital's waste generation rate falls within this average waste generation rate range, then proceed to the next step.

FORM 18 - YOUR HOSPITAL WASTE TYPE DISTRIBUTION

Waste Type	18.1 Your Hospital Waste Quantities (kg/yr)	18.2 Daily Quantity (kg/bed/day)	18.3 % of Total
Biomedical Human Anatomical			
Infectious non-anatomical			
General Wastes (report as "Clean" General Wastes) (Kitchen & General)			
Other Liquid & chemical Pharmaceutical Radioactive			
Total			

1.2 Determining the Presence of Large Waste Generating Areas

In order to further verify whether using this estimate approach will be useful at your particular facility, you should determine whether the large waste generation areas are present at your facility.

Potentially, large waste generating areas in hospitals are:

(1) Cafeteria and food preparation areas (Dietetics)
(2) Decontamination areas
(3) Inventory and receiving areas
(4) Nursery and gerontology areas
(5) Emergency
(6) Dialysis

In many hospitals, general waste originating from these areas alone can account for close to 50% of the waste disposed. If all these areas are represented at your hospital, you will be considered average and you can proceed to the next section. If they are not included in your facility, you may choose to use this estimation approach with caution, or consult the Companion Document for further guidance. You may also choose to use the detailed estimation approach found in Appendix 1. This approach is discussed in Part B, Section 2.3, and may be used in combination with the current approach or totally on its own. It will enable you to estimate waste generation of general and biomedical waste types by specific area.

1.3 Form 19: Identifying the Use of Disposable Items

To further establish the validity of this estimation approach, your hospital purchasing policies should be reviewed and large quantity disposable products evaluated. The use of non-durable (i.e. disposable) goods that have readily available, reusable alternatives should be identified.

If your hospital does not use many of these disposable items, then your general waste composition will differ from that presented for an average hospital. You may still use this estimation approach with caution, and note in which waste categories you would expect less materials. Otherwise, please refer to the Companion Document for other ways in which to identify your waste composition.

The use of disposable items in hospitals has been implicated in contributing to the solid waste problem. However, the impact of reusable items on other emission modes, such as water and air, and the functional efficacy of the items (i.e. performance, quality control, additional labour and storage requirements, acceptance by staff and patients, etc.), as well as cost factors, must be fully understood by each individual hospital before decisions to use one type of product over another are made. Compare the list of large quantity disposable items used at your facility with those at an average hospital.

The types and quantities of single use goods commonly used by hospitals include:

Paper	Some packaging materials, e.g. cardboard (i.e. for delivery of baked goods)
	Absorbent papers, e.g. diapers, incontinence, underpads, paper towels.
Plastics	Some packaging materials, e.g. food packaging (single serving drink containers; disposable coffee cups; pre-prepared foods - sandwiches), utensils
	Others - cleaning solution containers from housekeeping; foam mattresses; urine trays; delivery trays for medical products/procedures.

Wood	Some packaging materials: pallets; wooden crates
Metal	Some packaging materials: food and drink containers; pre-prepared bulk food containers
Glass	Some packaging materials, e.g. food packaging - single serving drink containers.

Supporting information for Form 19:

19.1 Report the use of large quantity disposable items that have readily available, reusable alternatives (e.g. disposable diapers and dishes). If possible, estimate the total quantity of used materials in kg per year. Total quantities should be obtained from purchasing, and reported as a quantity. Estimates can be made of the average weights of soiled items, such as disposable diapers, by questioning the appropriate staff and recording the total annual weights of waste.

19.2 Identify the location of the activity which is being evaluated. Use Form 2, or its equivalent from your own records, to make sure that you have surveyed all sections within your hospital.

By completing this section, you will be able to appreciate the types of single use disposable items that are currently used at your facility which might be replaced with reusable alternatives. Each individual hospital must evaluate all the factors specific to their facility which would be affected by this change, to make sure that it is a suitable option for them. Discussions with the areas using these materials should be undertaken to understand whether substitute materials are appropriate. In Part C, waste reduction alternatives and how to evaluate their suitability are presented.

FORM 19 - IDENTIFYING THE USE OF SELECTED ITEMS WHICH HAVE READILY AVAILABLE 'REUSABLE' ALTERNATIVES IN HOSPITAL USE THAT CAN CONTRIBUTE SIGNIFICANTLY TO SOLID WASTE QUANTITIES

19.1 Single Use Items Used	19.2 Location of Activity

2. ESTIMATING THE COMPOSITION OF YOUR WASTE STREAMS

The largest components of the waste stream are general waste, including kitchen waste. The composition of this general waste needs to be determined in order to develop suitable waste reduction, reuse and recycling programs at your hospital. Once the waste has been broken down to material types, the options for waste minimization program design become easier to choose.

2.1 Form 20: Estimating the Composition of General Solid Wastes

The first estimation of general waste composition can be made using the waste composition pie chart (Figure 1) that shows the proportions of different waste material types at an average hospital. Pretreated biomedical waste (infectious non-anatomical) is often disposed with other general wastes and is included in this chart which represents material disposed to landfill by an average hospital. These numbers are further shown in Form 20. From this form, you can determine the approximate composition of materials in your waste stream. You will be able to estimate the yearly quantities of these waste materials at your facility by using the information you have reported in Form 16.

Supporting information for Form 20:

20.1 Record the total quantity of general waste disposed (Form 16), and add this to the total quantity of general waste currently recycled at your facility (Form 16). Record this as the total general waste generated at your facility in tonnes per year. For example,

In Hospital A:

Total general waste disposed (clean and pretreated infectious non-anatomical)	=	1,216.8 tonnes/year
Total general waste recycled	=	est. 47.6 tonnes/year
Total general waste generated by Hospital A	=	1,264.4 tonnes/year

20.2 To estimate your hospital's general waste composition, take the total waste generated number from 20.1, multiply by the percentage figure given in the column entitled "% Composition in Hospital Waste", and divide by 100.

For example, to find the total quantity of boxboard disposed by Hospital A, the following calculation was carried out:

1,264.4 tonnes per year generated x 2.5% boxboard ÷ 100

= 28.24 tonnes/year of boxboard

= 28,240 kg/year

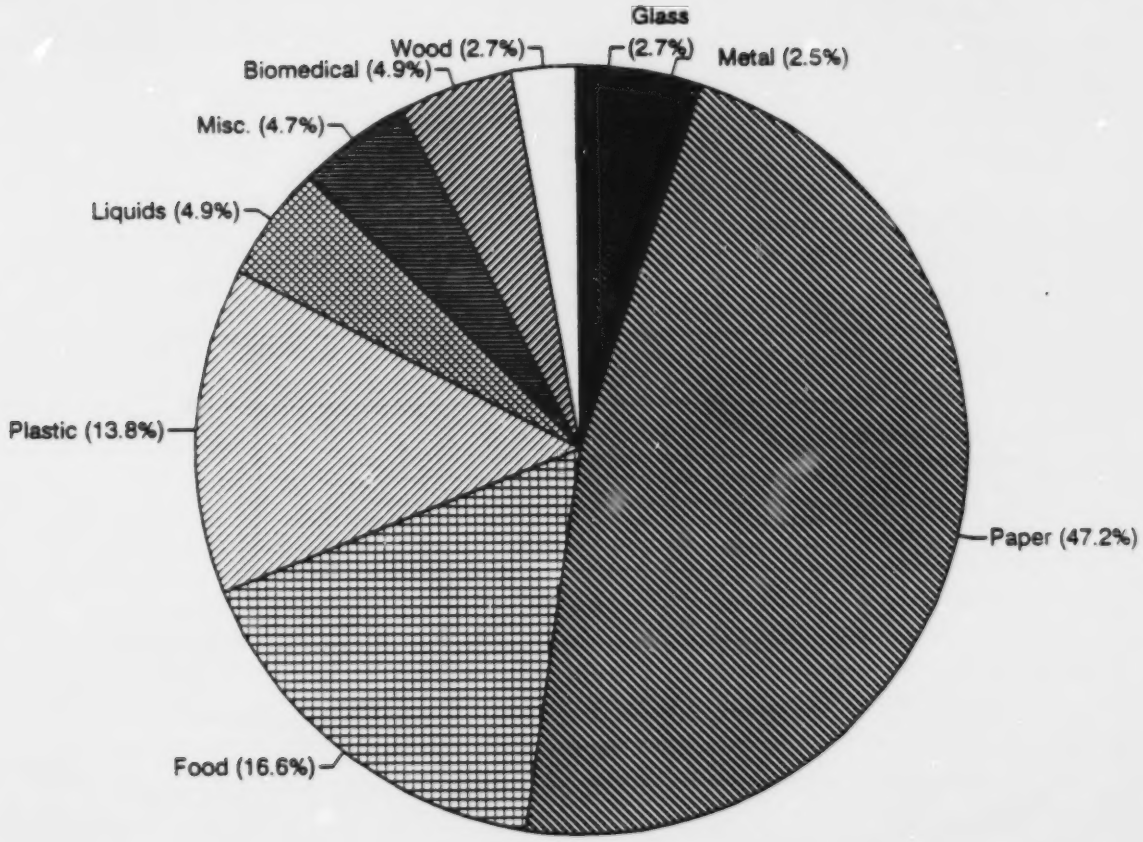
Enter your equivalent number in column 20.2 for each material.

20.3 In your area, some materials may be banned from landfill disposal. Note which of these banned materials are part of your waste stream.

When you have completed this Form, you will have rough estimates of the types and quantities of general waste materials generated by your facility. You now need to determine where these wastes are most likely generated. This is discussed in the next section.

FIGURE 1 - HOSPITAL GENERAL WASTE COMPOSITION

(% by weight)



FORM 20 - ESTIMATING THE COMPOSITION OF GENERAL WASTE

20.1 Total General Waste Generated _____ tonnes/year

Waste Material Category	% Composition for Average Hospital Waste	20.2 Your Estimate (tonnes/yr)	20.3 Regulated Disposal
PAPER			
Potentially Recyclable			
Boxboard	2.5		
Computer printout	2.1		
Office paper	4.7		
Kraft paper	0.2		
Newspaper	1.3		
Cardboard	13.2		
Sub-total	**24.0**		
Potential for Reusable Substitutes			
Diapers	2.5		
Incontinence	4.4		
Underpads	2.3		
Sub-total	**9.2**		
Probably Non-Recyclable			
Miscellaneous paper	3.3		
Wet paper and gauzes	9.0		
Medical sterile packaging	1.5		
Hairnets, boots, etc.	0.2		
Sub-total	**14.0**		
PAPER TOTAL	**47.2**		
FOOD	**16.6**		
PLASTICS			
Medical plastics	7.2		
Gloves	1.4		
Packaging film	2.4		
Food and other container	1.9		
Polystyrene	0.9		
PLASTICS TOTAL	**13.8**		

FORM 20 (Contd.)

20.1 Total General Waste Generated _____tonnes/year

Waste Material Category	% Composition for Average Hospital Waste	20.2 Your Estimate (tonnes/yr)	20.3 Regulated Disposal
LIQUIDS			
Medical	1.1		
Blood	< 0.1		
Urine	< 0.1		
Food	3.7		
LIQUIDS TOTAL	**4.9**		
BIOMEDICAL			
Pretreated On-site Infectious non-anatomical	4.9		
BIOMEDICAL TOTAL	**4.9**		
WOOD			
Pallets and crates	2.7		
WOOD TOTAL	**2.7**		
GLASS			
Container glass	2.6		
Borosilicate glass	0.3		
GLASS TOTAL	**2.9**		
METAL			
Food containers	2.3		
Medical implements	0.2		
METAL TOTAL	**2.5**		
MISCELLANEOUS	**4.7**		
TOTAL	**100.0**		

2.2 Form 21: Identifying Where the Waste is Generated

Once you have identified the waste material components within the general waste stream, you must find out where these wastes are generated within your facility. This will allow you to develop waste reuse and recycling alternatives suitable for individual areas throughout your hospital.

You can identify the expected waste generating areas by using the information supplied in this section. Table 3 shows the estimates of the percentage distribution of the general waste material categories in an average hospital. Only clean, general waste is given here, because this waste stream has the greatest potential for waste reuse or recycle opportunities. Reuse and recycling opportunities for pretreated, infectious non-anatomical wastes have not yet reached commercially available status because of the physical contaminants such as blood, urine, etc. Refer to Appendix 1 to determine specific information about biomedical waste generating areas. You can use Table 3 to determine where large quantities of waste types may be collected either for recycling or reuse, or replaced with more durable products.

Supporting information for Form 21:

21. Calculate the actual waste quantity distribution in your hospital. Take the amount for total waste generated in kg/year for each material type (Form 20), and multiply by the percentage number given in each column of Table 3. This will give you the total weight of waste predicted to be generated by your hospital in specific areas. Record this number in the appropriate space in Form 21. For example, Hospital A generated 28,240 kg of boxboard throughout the hospital (see Section 20.2). The distribution of this waste material within Hospital A is calculated using the figures found in Table 3:

    Patient Care generates 24% of all boxboard waste

    ∴ Patient Care generates:
    24/100 x 28,240 kg/yr = 6,778 kg/yr in the Patient Care area.

    Support services generates 41% of all boxboard waste

    ∴ Support Services generates:
    41/100 x 28,240 kg/yr = 11,578 kg/yr in Support Service areas

FORM 21 - Estimates of Distribution of Clean General Waste Material in your Hospital

Material Categories	Generation Area Distribution kg/yr							
	Patient Care	Patient Service			Laboratories	Administration	Support Services	Miscellaneous	Total
		Diagnostic	Service	Therapeutic					
Paper									
Potentially Recyclable									
Boxboard									
Computer Printout									
Office Paper									
Kraft Paper									
Newspaper									
Cardboard									
Subtotal									
Potential for Reusable Substitute									
Diapers									
Incontinence									
Underpads									
Subtotal									
Probably Non-Recyclable									
Misc. Paper									
Wet Paper and Gauzes									
Medical Sterile Packaging									
Hairnets, boots, etc									
Subtotal									
Paper Total									

FORM 21 (Contd.)

Material Categories	Generation Area Distribution kg/yr							
	Patient Care	Patient Service			Laboratories	Administration	Support Services	Miscellaneous	Total
		Diagnostic	Service	Therapeutic					
Food									
Plastics Medical Plastics Gloves Packaging Film Food & Other Containers Polystyrene									
Plastics Total									
Liquids Medical Blood Urine Food									
Liquids Total									
Wood Pallets and Crates									

FORM 21 (Contd.)

Material Categories	Generation Area Distribution kg/yr							
	Patient Care	Patient Service			Laboratories	Administration	Support Services	Miscellaneous	Total
		Diagnostic	Service	Therapeutic					
Glass									
Container Glass									
Borosilicate Glass									
Glass Total									
Meta									
Food Containers									
Medical Implements									
Metal Total									
Miscellaneous									

TABLE 3 - Estimates of Distribution of Clean General Waste Material in an Average Hospital

Material Categories	Generation Area % Distribution								
		Patient Service							
	Patient Care	Diagnostic	Service	Therapeutic	Laboratories	Administration	Support Services	Miscellaneous	Total
Paper									
Potentially Recyclable									
Boxboard	24	4	18	3	6	2	41	2	100
Computer Printout	8	17	2	3	20	40	2	8	100
Office Paper	14	11	11	19	6	21	16	2	100
Kraft Paper	15	10	5	4	9	4	53	0	100
Newspaper	54	5	6	2	6	6	21	0	100
Cardboard	11	1	5	1	3	3	50	26	100
Subtotal	17	5	8	5	7	10	37	11	100
Potential for Reusable Substitute									
Diapers	99	1	0	0	0	0	0	0	100
Incontinence	99	< 1	< 1	0	0	0	0	0	100
Underpads	80	2	16	0	2	0	0	0	100
Subtotal	94	1	4	0	1	0	0	0	100
Probably Non-Recyclable									
Misc. Paper	28	4	20	7	11	12	18	0	100
Wet Paper and Gauzes	48	4	20	1	5	5	17	0	100
Medical Sterile Packaging	47	6	30	1	2	0	14	0	100
Hairnets, boots, etc	35	2	58	0	3	2	0	0	100
Subtotal	43	4	22	3	6	6	16	0	100
Paper Total	41	4	12	2	5	7	23	6	100

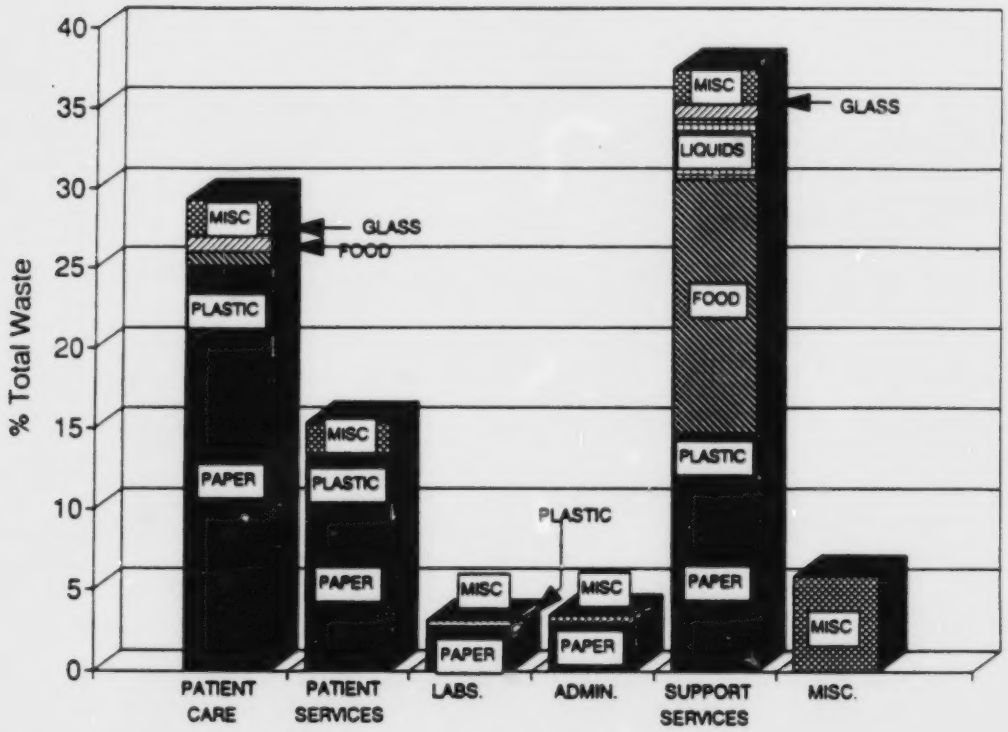
TABLE 3 (Contd.)

Material Categories	Generation Area % Distribution								
	Patient Care	Patient Service			Laboratories	Administration	Support Services	Miscellaneous	Total
		Diagnostic	Service	Therapeutic					
Food	8	1	1	1	1	1	87	0	100
Plastics									
Medical Plastics	48	4	34	1	7	1	4	1	100
Gloves	54	4	29	1	7	3	2	0	100
Packaging Film	43	7	13	1	9	3	23	1	100
Food & Other Containers	16	1	3	2	1	2	75	0	100
Polystyrene	27	3	10	3	1	5	49	2	100
Plastics Total	41	5	24	1	6	1	20	2	100
Liquids									
Medical	56	4	38	0	2	0	0	0	100
Blood	100	0	0	0	0	0	0	0	100
Urine	0	100	0	0	0	0	0	0	100
Food	4	1	3	0	0	1	91	0	100
Liquids Total	17	1	10	0	1	< 1	70	< 1	100
Wood									
Pallets and Crates	0	0	0	0	0	0	100	0	100

TABLE 3 (Contd.)

Material Categories	Generation Area % Distribution								
	Patient Care	Patient Service			Laboratories	Administration	Support Services	Miscellaneous	Total
		Diagnostic	Service	Therapeutic					
Glass									
Container Glass	48	1	3	2	2	2	38	4	100
Borosilicate Glass	34	8	35	1	22	0	0	0	100
Glass Total	46	2	6	2	5	1	34	4	100
Metal									
Food Containers	16	1	5	1	1	3	72	1	100
Medical Implements	46	1	22	0	10	2	19	0	100
Metal Total	18	2	7	1	1	3	67	1	100
Miscellaneous	9	2	8	1	3	1	6	71	100

FIGURE 2 - CLEAN GENERAL WASTE GENERATION TYPES AND QUANTITIES BY AREA



The individual waste generating areas within an average hospital are presented in Figure 2. As can be seen, the two largest generating areas are Support Services (37.7%) and Patient Care (29.5%) which, together, comprise close to 70% of the hospital's clean general waste. The individual waste components are shown within the bar graphs. By noting the relative sizes of the waste categories in each section, you can determine that, by developing waste reduction, reuse or recycling initiatives in certain areas with certain materials, you will be able to significantly alter the waste producing capacity in your hospital.

In an average hospital, close to 50% of all waste is generated from 8 areas. These 8 areas, grouped according to sections, are listed below:

Support Services:	Decontamination (15.6%) Dietetics (13.0%) Inventory Control (3.1%)
Patient Care:	Nursery (5.3%) General Medicine, Gerontology/ Rheumatology (2.4%) General Medicine, Pulmonary Cardio (2.3%)
Patient Services:	Service Areas Emergency (3.3%) Dialysis (2.4%)
Total % of Hospital Waste:	47.4%

Using the information that you have reported in Form 20 (Estimating the Composition of General Waste), Form 21 (Estimates of the Distribution of Clean General Waste Materials in your Hospital) and from information in Figure 2 (Clean General Waste Generation Types and Quantities by Area), you can begin to assess your reduction, reuse and recycling priorities in the general waste category.

2.3 Conducting a More Detailed Estimation of Waste Composition

If you would like to assess, in more detail, the different types of waste materials that are likely generated in specific areas throughout your hospital, refer to Appendix 1. Using the information in the charts presented, you can conduct a more detailed estimation of waste composition by using the Waste Activity Factors given. These Waste Activity Factors were obtained from a detailed waste audit where waste quantities were related to an activity that caused the waste to be produced. To use this more detailed estimation, you will still need to qualify as an "average" hospital, as was described in Section B-1. Otherwise the results should be used with caution.

3. DETERMINING THE COMPOSITION OF OTHER WASTE STREAMS

Other wastes generated by a hospital will not require as complex an evaluation, but components must be identified in order to evaluate potential waste reduction, reuse or recycling initiatives (Part C). You should be familiar with the specific regulations and guidelines that govern the disposal of these wastes, where appropriate, so that you can also determine that your hospital is in compliance with these procedures (review Part A, Section 2). Most of this information should be available from purchasing records or by talking with informed staff.

3.1 Form 22: Confidential Shredded Waste Composition

22.1 Determine the types of paper waste or other contaminants present as confidential shredded waste. Examples are given in Form 22.

22.2 Estimate the fraction of each material component.

3.2 Form 22: Biomedical Waste Composition

22.1 Determine the specific types of materials being disposed as biomedical waste. Contact Infection Control, nursing staff and others who disposed of this waste to understand whether much general waste (i.e. paper towels, packaging materials, such as plastic wrappers, etc.) is disposed with biomedical wastes. Also record whether placentae (from Labour and Delivery) are disposed in this category as anatomical waste.

22.2 Estimate the fraction of each material component. For placentae, identify an average quantity per year by the number of babies born. Use an average weight of placenta as 0.45 kg.

FORM 22 - IDENTIFYING COMPOSITION OF OTHER WASTES

Waste Category	22.1 Waste Material	22.2 Estimated % in Waste
Confidential Shredded Waste	Carbon paper Computer printout File folders Non carbon paper Office paper Other:	
Biomedical Waste	General waste (i.e. paper towels, packaging materials, such as plastic wrappers Placentae Other:	

3.3 Form 23: Liquid and Chemical Wastes

Hospitals generate numerous types of liquid and chemical wastes that are discharged to the sewer, evaporated to the atmosphere or mixed in with general or biomedical wastes, as well as those materials identified as going to hazardous waste disposal. In order to determine if your hospital's disposal practices are in compliance with local, provincial and federal use and disposal regulations, you should determine what other liquid and chemical wastes are being discharged from your facility. Once these other liquid and chemical wastes have been identified, you should also explore potential waste reduction, reuse or recycle initiatives. Table 4 lists common liquid and chemical materials used at an average hospital. This table should be used as a guide to determine which wastes are generated at your facility.

Supporting information for Form 23:

23.1 Note the materials that are identified in Table 4 and record those which are used at your facility.

23.2 Note which of these materials are currently regulated for disposal by contacting your local municipality for Sewer Discharge Bylaws, and your provincial Ministry of the Environment for Hazardous Waste Disposal Regulations. You should also be aware of new provincial and federal regulations which will restrict the usage of materials such as chlorofluorocarbons (CFCs). Note these regulated materials by placing an R beside the material in Column 23.2 You may wish to pursue only these waste reduction, reuse or recycle initiatives with these regulated materials at this time. Proceed to fill in the next columns for those materials you wish to identify further.

23.3 Identify where the material is used and disposed within the hospital.

23.4 Estimate the quantity disposed by reviewing yearly purchased quantities.

23.5 Record the disposal route currently used at your facility. This could include: (1) to sewer (or septic); (2) storm sewer; (3) pretreatment on-site, and discharge to sewer; (4) evaporation or discharge to atmosphere; (5) disposal with general waste; (6) disposal with biomedical waste; (7) ingestion by patients and metabolized or discharged either at the hospital or elsewhere.

TABLE 4 - Common Liquid and Chemical Wastes Discharged from Hospitals

Material	Example & Use	Area of Expected Generation
Solvents		
Aromatics	Toluene, tissue staining Xylene, tissue staining	Laboratories: Histology
Aliphatic	Methanol, tissue staining Ethanol, tissue staining	Laboratories: Histology
Formalin	Formaldehyde/Methanol • tissue preservation (fixative) • cleaning of haemodialysis units	Laboratories: Pathology, Morgue Patient Service: Haemodialysis
Halogenated	Methylene chloride solvent CFC, freezing application (1 lb canisters) CFC, air drying CFC, air conditioning Halons, fire extinguishing equipment Halogenated gases; anaesthetic gases i.e. halothane (Fluothane) enflurane (Ethrane), isoflurane (Forane) Ethylene Oxide/CFC12 on-site sterilizing gases for medical procedural equipment Solvent still bottom residuals from on-site distillation of waste solvents	Laboratories Laboratories Support Services: Engineering Support Services: Engineering Support Services: Engineering (throughout building) Support Services: Operating Room, Recovery & Anaesthesia Support Services: Decontamination area, Engineering Laboratory
Miscellaneous Waste Organic and Inorganic Chemicals	Out of date laboratory chemicals of all types Mercury • broken thermometers • batteries used in medical equipment, i.e. small IV pumps • expired fluorescent lights	Laboratories: all Patient care and patient service areas, e.g. biomedical engineering Support services throughout building Patient services: Surgery, Biomedical Engineering Support services: Engineering (throughout building)

Table 4 (Contd.)

Material	Example & Use	Area of Expected Generation
Waste Oils	Lubricating oils in pumps	Support services: Engineering, Patient Services: Biomedical Engineering
	Vegetable cooking oils	Support services: Dietetics
Petroleum Distillates	Varsols, paint brush cleanup	Support services: Engineering
Photographic Chemicals	Fixers (containing silver) and developers, X-ray film developing	Patient services: Radiology, Ultrasound, Cancer Clinic Laboratories: Research Labs Support services: Audiovisual Dept.
Detergents/ Disinfectants	Phenol based disinfectants used for floor scrubbing fumehood cleaning	Support services: Housekeeping - kitchen, laboratories, pharmacy, throughout the building
	Detergents from laundry	Support services: Housekeeping
Pesticide/Herbicide	Used in facility landscaping	Support Services: Engineering or Contract workers
Others		
Waste Paints	Enamel, latex and oil based paints, from facility maintenance	Support services: Engineering
Macerated Food Wastes, Liquids	Food waste particles and liquids (high organics), from macerating food wastes	Support services: Dietetics
Pressurized Cylinders	Metal pressurized cylinders, either empty or containing residual gas, to deliver specific gas requirements	Support services: Engineering and, potentially, throughout building

FORM 23 - LIQUID AND CHEMICAL WASTES DISCHARGED FROM YOUR HOSPITAL

23.1 Material	23.2 Regulated Disposal	23.3 Area Used	23.4 Estimated Quantity kg or L/yr	23.5 Current Disposal Route

3.4 Form 24: Radioactive Waste Components

Hospitals use numerous types of radioisotopes for patient treatment, diagnostic or research purposes. Waste reduction, reuse or recycle opportunities in this waste group are limited, but can include substituting long-life and high energy radioisotopes for less hazardous materials, returning unused portions to suppliers; and returning or recycling packaging materials.

Table 5 lists common radioisotopes found in hospitals and the generating areas. This Table can be used as an introductory guide to determine which materials are used, and where, in your facility, but you should refer to your hospital radioisotope licence (obtained from your Radiation Safety Officer) for actual materials used.

Supporting information for Form 24:

24.1 List which materials are used at your facility. Note the long-life and high energy materials and find out from your Radiation Safety Officer if he/she has explored the use of less hazardous radioisotopes.

24.2 Record where in the hospital this material is used and disposed.

24.3 List the types of packaging used to ship these materials (e.g. outer packaging could be lead or plastic containers).

24.4 Note the current disposal route for this packaging.

FORM 24 - RADIOACTIVE WASTE COMPONENTS

24.1 Material	24.2 Area Used and Disposed	24.3 Packaging Type	24.4 Current Disposal Route for Packaging

TABLE 5 - COMMON RADIOISOTOPE USAGE IN HOSPITALS

		USE			
		Calibration	Mark	Machine	Area Used
Sealed Source					
Americium	Am 241	X			Patient Service: Nuclear medicine
Barium	Ba 133	X			Nuclear medicine
Cobalt	Co 57	X	X		Nuclear Medicine
Cobalt	Co 60	X			Nuclear Medicine
Cesium	Cs 137	X		X	Nuclear Medicine/Cancer Clinic
Gadolinium	Gd 153			X	Nuclear Medicine
Iridium	Ir 192			X	Cancer Clinic
Unsealed Source					
Technetium	TC 99	X			Patient Service: Nuclear Medicine
Iodine	I 131	X	X		Nuclear Medicine
Chromium	Cr 51	X			Nuclear Medicine
Cobalt	Co 57	X		X	Laboratory, Patient Service: Biochemistry/Nuclear Medicine
Cobalt	Co 58	X			Patient Service: Nuclear Medicine
Gallium	Ga 67	X			Nuclear Medicine
Phosphorus	P 32			X	Laboratory, Patient Service: Research Labs/Nuclear Medicine
Thallium	Th 201	X			Patient Service: Cardiopulmonary/Nuclear Medicine
Tritium	H 3			X	Patient Service, Laboratories: Nuclear Medicine/Research Labs/Biochemistry
Carbon	C 14			X	Laboratories, Patient Service: Research Lab/Nuclear Medicine

Table 5 (Contd.)

		USE			
		Cali-bration	Mark	Machine	Area Used
Iodine	I 125			X	Patient Service, Laboratories: Nuclear Medicine/Research Labs/Biochemistry
Iodine	I 123	X			Patient Service: Nuclear Medicine
Iodine	I 131	X			Cancer Clinic
Indium	In 111	X			Nuclear Medicine
Sulfur	S 35			X	Laboratory: Research Labs

3.5 Form 25: Pharmaceutical Waste Composition

In most hospitals, information about the disposal of non-regulated materials on-site is not well documented. In most cases, unused prescription pills are flushed down the toilet and into the sewer system. Determine how staff at your hospital dispose of these wastes and record this information on Form 25. There are very limited waste reduction, reuse or recycling opportunities for this waste type.

Supporting information for Form 25:

25.1 Note which materials are generated as pharmaceutical wastes (excluding cytotoxics and some other materials which were recorded in Part A, Section 2).

25.2 Identify the disposal procedure and route by asking nursing and pharmacy staff.

25.3 If possible, estimate quantities of these pharmaceuticals disposed.

FORM 25 - PHARMACEUTICAL WASTE COMPOSITION

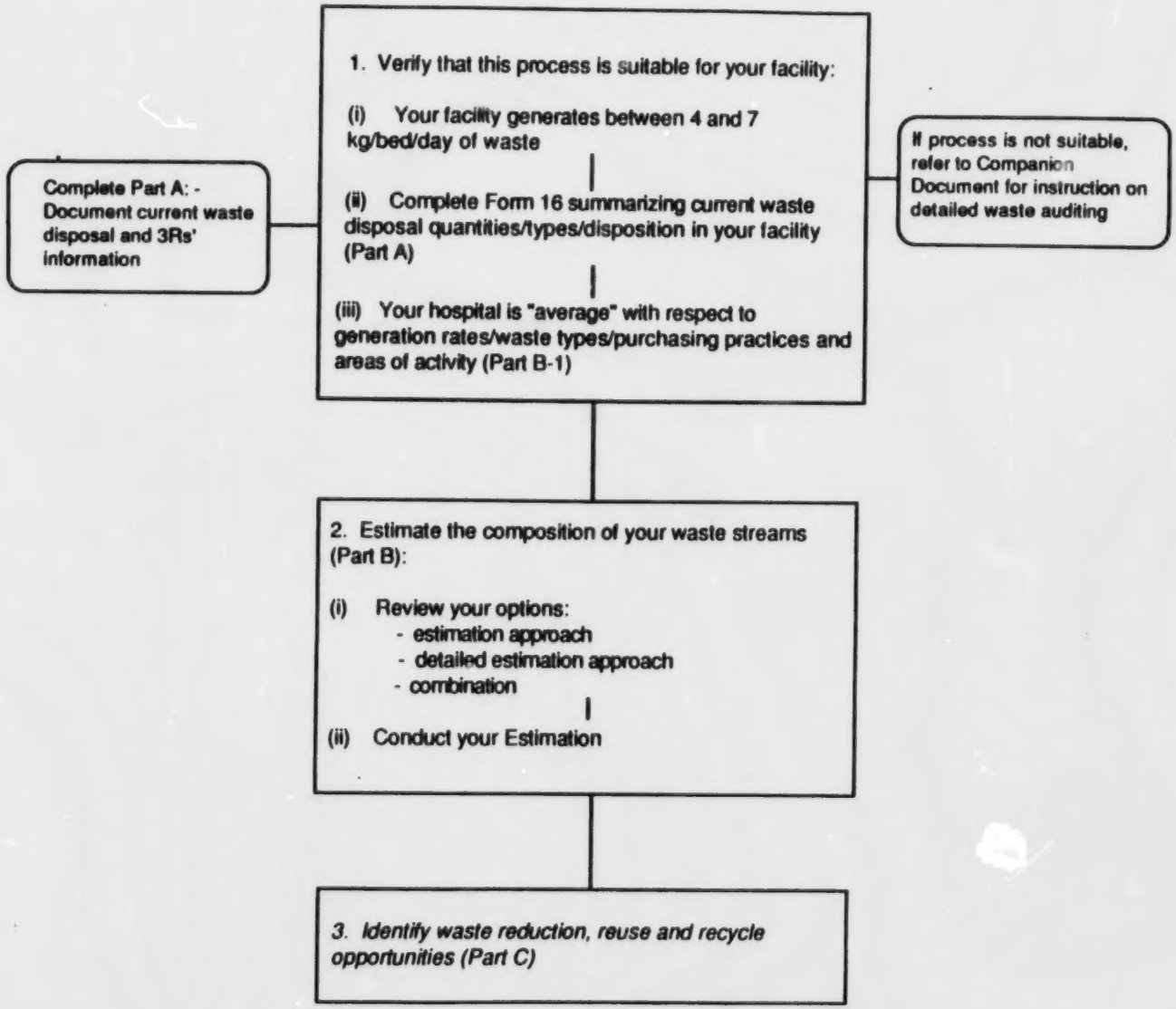
25.1 Material	25.2 Disposal Procedure and Route	25.3 Estimated Quantity/year
Out of date Prescription Drugs (from Pharmacy)		
Unwanted Prescription Drugs (from Patient Care areas)		
Selected Narcotics (from Pharmacy)		
Other Pharmaceuticals (List) (from Pharmacy preparation areas)		

By completing PART A and PART B, you will have identified the types and quantities of wastes disposed and recycled at your facility and where these wastes are generated. With this information, you can proceed to Part C, which will identify potential waste reduction, reuse and recycle opportunities that may be suitable for your facility.

PART C IDENTIFYING WASTE REDUCTION, REUSE AND RECYCLE OPPORTUNITIES

This section will assist you in using information collected in Parts A and B to identify 3Rs' opportunities which may be suitable for your facility. This is the last step in the overall waste estimation process, as outlined in the Flowchart.

FLOWCHART: HOW THIS PROCESS IS ORGANIZED


1. Verify that this process is suitable for your facility:
(i) Your facility generates between 4 and 7 kg/bed/day of waste
(ii) Complete Form 16 summarizing current waste disposal quantities/types/disposition in your facility (Part A)
(iii) Your hospital is "average" with respect to generation rates/waste types/purchasing practices and areas of activity (Part B-1)
Complete Part A: - Document current waste disposal and 3Rs' information
If process is not suitable, refer to Companion Document for instruction on detailed waste auditing
2. Estimate the composition of your waste streams (Part B):
(i) Review your options:
- estimation approach
- detailed estimation approach
- combination
(ii) Conduct your Estimation
3. Identify waste reduction, reuse and recycle opportunities (Part C)

1. EXAMINING OPPORTUNITIES FOR REDUCTION, REUSE AND RECYCLE

The purpose of doing a waste audit is to understand what wastes are generated by what procedures, where in the hospital, so that consideration can be given to reducing the quantities of wastes generated or reusing and recycling components from the waste stream.

Describing waste reduction, reuse and recycling opportunities generically is very difficult, as they are very dependent upon procedures and purchasing practices, which vary from hospital to hospital, and recycling facilities where availability varies according to the location of the hospital.

What is described in this section is: (a) a general approach to deciding how to establish priorities for the examination of 3Rs' opportunities; and, (b) some examples of opportunities from an audit at Hospital A. It is important that the Environmental Committee become involved in reviewing the results of Part A and Part B in order to select appropriate waste minimization initiatives.

1.1 A General Approach to Establishing Priorities

There are 6 criteria to consider in establishing priorities for considering waste reduction, reuse and recycling initiatives.

(1) Is recycling of the waste regulated by provincial statute or by local municipal bans on material going to landfill, e.g. cardboard, wood, etc.?

(2) Is the waste generated in large quantity, so that reduction, reuse, recycle initiatives would make a significant impact on total waste diverted?

(3) Are there feasible opportunities for reduction, reuse and recycle that can be applied?

(4) Is a high proportion of the waste generated in relatively few areas of the hospital, thus making the establishment of internal infrastructure easier?

(5) Are there environmental enthusiasts in the department generating the waste?

(6) Is the application of 3Rs financially feasible?

These are each discussed briefly below.

1.1.1 Regulation

Waste reduction is becoming subject to regulation by several levels of government. For example, the federal government's National Packaging Protocol has established specific targets for packaging waste reduction which may result in regulations being put in place to achieve these guidelines, and restrictions on chlorofluorocarbon use are also imminent.

Provincial governments are also establishing targets for waste reduction and may have requirements of hospitals to segregate and recycle certain materials or packages. Some municipal governments have established landfill bans for materials that they deem to be recyclable.

You should check with your local municipality and province to understand which wastes are not permitted to go for disposal. These materials obviously must have a high priority when examining potential reduction, reuse and recycle opportunities.

Materials that may be included here are: old corrugated cardboard, fine paper, tires, drywall from construction, "blue box" materials such as food and drink cans and bottles, and newspapers, and CFCs.

1.1.2 Large Quantities

The largest single waste type generated by a hospital is general waste. Form 20 gives a breakdown, by percentage. of material types making up the total waste generated by a hospital in this category. You have already used this form to estimate the quantities of different materials being generated as wastes at your hospital. Because you want to divert the maximum amount of waste from disposal, it makes sense to give priority to those wastes generated in large quantities in considering reduction, reuse, and recycling opportunities. Examples of large quantity materials are: (1) food, 16.6%; (2) cardboard, 13.2%; (3) diapers, incontinence and underpads, 9.2%; (4) wet paper and gauzes, 9.0%; and,(5) medical plastics, 7.2%. Further analysis may prove that it is not possible to reduce these materials technically or economically, but it makes sense to give priority to examining potential for these large streams.

1.1.3 Feasibility of Reduction, Reuse and Recycle Initiatives

Table 6 is an assessment of how easy it might be to introduce reduction, reuse and recycle opportunities for specific material types. The Table considers technology, infrastructure and markets in assessing how easy it might be to introduce 3Rs' approaches for various materials. Taking old corrugated cardboard as an example for reduction/reuse, the Table suggests two options: (a) reusable totes deemed technologically available today and which have a readily achievable infrastructure; and, (b) reduced quantities per cardboard box deemed technologically unavailable, but requiring no infrastructure change. For recycling of OCC, the Table suggests that infrastructure, transportation technology and markets are all potentially available today. Thus, OCC might be considered a readily reducible or recyclable material that hospitals should give high priority to considering for waste diversion.

Food waste, which is another of the larger waste streams, is considered slightly less advanced in development of commercially applied reduction or recycling opportunities. In some areas, food waste reuse as an animal feed has been done, and even composting projects have been initiated.

1.1.4 Limited Distribution of Waste Generating Areas in the Hospital

Table 6, which addressed the efficacy of recycling approaches, also noted the areas within the hospital that are major generators of these materials. This is defined more quantitatively in Table 3. This Table details, for each waste material, what proportion of this material is generated where in the hospital. For those materials where the majority of the waste is generated in relatively few locations, the introduction of reduction or reuse will involve fewer changes to operations and impact on fewer staff, and recycling will involve a much simpler collection infrastructure. Examples of wastes where the majority is produced in relatively few places are: food waste, 87% in support services; OCC, 50% in support services; and 20% miscellaneous, which is all delivered separately to receiving.

1.1.5 Environmental Enthusiasts

An essential part of successful waste reduction, reuse and recycle programs are enthusiastic people who want to make things work. Wherever you find such groups, you should consider programs for their areas.

TABLE 6 - Definition of Reduction, Reuse and Recycling Potentials

Reduction, Reuse/On-Site

Potential	Technology	Internal Infrastructure
1	Commercially applied	In place
2	Demonstrated minimal changes	Readily achievable,
3	Not demonstrated	Substantial change required

Reuse & Recycling/Off-Site

Potential	Internal Infrastructure	Transportation* Infrastructure	Technology For Recycle	Markets for Recycled Products
1	In place	In place	Commercially applied	Extensive
2.	Readily achievable, minimal change	Readily developed with suppliers	Demonstrated	Limited
3.	Substantial change	Difficult to develop	Not demonstrated	Non existent

*Will be very location dependent

TABLE 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site	Potential				Major Sources in Hospital
		Tech	Infras.		Internal Infras.	Transport	Technol	Markets	
Paper									
Boxboard	Ask suppliers to reduce packaging	3	2	Collect for recycle	2	2	2	2	Patient Care Support Services
CPO	Examine uses: reduce copies of reports; use electronic mail systems; ship reports on reusable disks.	1	2	Collect & ship to recycler	2	1	1	1	Almost all areas majority from Admin
Office Paper	Reduce usage: electronic mail; examine need for reports, etc.; circulate memos; double sided copying.	1	2	Collect & sell to recycler	2	1	1	1	Almost all areas, high in Admin & Support Services
News-paper	Unlikely to reduce (encourage sharing)			Collect & get municipality to pick up from blue box	2	2	1	1	Almost all areas high in Patient Care & Support Services.

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential Tech	Potential Infras.	Reuse & Recycling Off-site	Potential Internal Infras.	Potential Transport	Potential Technol	Potential Markets	Major Sources in Hospital
OCC & Kraft	Ask suppliers for reusable totes	1	2	Collect, flatten or bale & ship to recycler	1/2	1	1	1	Support Services
	Ask Suppliers to reduce quantity of OCC	3	1						
Adsorbent Paper	Switch to reusables: Reduce usage - judicious use of underpads;	1	2	Compost	2	2 off-site - on-site	2	2 off-site 1 on-site	Patient Care
	reexamine need for incontinence in non ambulatory patients.	1	1	recycle for paper and plastic content	2	2/3	2/3	2/3	
Wet Paper Gauzes	Examine uses: reduce where possible (e.g. paper towels)	3	2	Compost	2	2 off-site - on-site	2	2 off-site 1 on-site	Patient Care Patient Services
	Investigate hot air dryers in washrooms	1/3							
Other	Examine all uses of packaging, ask suppliers to reduce.	3	3	Compost if materials are deemed suitable (low inorganic ink content, etc.)	2	2 off-site - on site	2	2 off-site 1 on-site	All areas
				Encourage suppliers to package materials in recyclable paper or plastic or compostible materials	2	2	2/3	2	All areas

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential Tech	Potential Infras.	Reuse & Recycling Off-site	Potential Internal Infras.	Potential Transport	Potential Technol	Potential Markets	Major Sources in Hospital
Food	Eliminate disposable use of plastics in Cafeteria & patient care food services for better quality compost or animal feed	1	3	Compost	2	2 off-site - on-site	2	2 off-site 1 on-site	Support Services Minor amounts from other areas
Food (from prep. areas				To Pig Farmers or Commercial Operation	1	1	1	1	Support Services: Dietetics
Plastic									
Food & Other Container Plastic	Eliminate if possible	1	3	Collect separately, ship to recycler	3	2	1	1	Support Services
	Examine bulk dispensing of materials such as in Housekeeping (soaps & cleansers)	1/2	1/2						
Film Package	Examine all uses, eliminate where possible	1	3	Collect separately, ship to recycle	3	2	1	1	Most areas, high in Support Services & Patient Care
Polystyrene (PS)	Eliminate or reduce foam cups,etc.,(e.g. 'Lug-a-Mug' program), ask suppliers not to ship in PS Peanuts	1	2	Collect separately, ship to recycler	3	2	1	1	Support Services Patient Care

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site	Potential				Major Sources in Hospital
		Tech	Infras.		Internal Infras.	Transport	Technol	Markets	
Medical Plastics	Examine all procedures using disposable plastics to determine which can be changed (e.g. disposable procedural trays substituted with on-site prepared reusable trays)	3/1	3/1	Collect different polymers separately, ship to recycler	3	2/3	1	1	Patient Care Patient Services
				Contact suppliers to take back specific items	2	1/2	1/2	1	
Gloves	Unlikely to substantially reduce because of safety, examine whether single type of glove can be used throughout hospital			Collect PVC gloves separately, ship to recycler.	3	2	2	2	Patient Care Patient Services
				Latex gloves				3	
Glass									
Food Container Clear Glass	Investigate other container systems such as bulk dispensing in Cafeteria	1	3/1	Collect separately, get municipalities to pick up in blue box	2	2	1	1	Support Services & Patient Care (e.g. Cafeteria & Nursery)
Amber Glass	Purchase chemicals in bulk containers			Collect separately, (rinsing may be required), possible commercial pick up for recycle	2	2	1	3	Laboratories Patient Services

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site	Potential				Major Sources in Hospital
		Tech	Infras.		Internal Infras.	Transport	Technol	Markets	
Boro-silicate Glass	Encourage suppliers to investigate other container systems	2	3	No market presently available	3	3	3	3	Patient Care Patient Services Laboratories
Metal									
Food Metal	Investigate other container systems of bulk shipments	1	2	Collect separately, get municipalities to pick up in blue box	2	2	1	1	Support Services Minor amounts elsewhere
Medical Metal	Explore use of better quality instruments which are reusable, not disposable	1	2	Collect in commercial scrap metal recycling bin	3	2	1	1	
Wood									
Packag-ing (pallets)	Reuse pallets where possible, work with suppliers to take back	1	1	Work with pallet recyclers to pick up pallets (need to store on-site)	1-3	1-3	1	1	Support Services

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site	Potential				Major Sources in Hospital
		Tech	Infras.		Internal Infras.	Transport	Technol	Markets	
Bio-medical									
Anato-mical Wastes	Reduce non-anatomical materials in containers (i.e. packaging wastes)	1	1	Explore options for use as feedstock in pharmaceutial manufacturing (i.e. placentae)	1/2	1/2	1/2	1/2	Patient Services Laboratories
Infectious non-anato-mical	For large generating areas use larger containers for collection	1	1		1	2	2/3	2/3	Laboratories Patient Care Patient Services
Sharps	Reduce non sharp items in container (i.e. paper towels, gloves)	1	1	Explore sharp & sharp container recycling using new tech-nologies (for poly-propylene content)					
Micro-biology wastes	Reduce non infectious waste items in containers	1	1						
Blood & Body Fluids	Reduce non blood & body fluids items in containers	1	1						

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential Tech	Potential Infras.	Reuse & Recycling Off-site	Potential Internal Infras.	Potential Transport	Potential Technol	Potential Markets	Major Sources in Hospital
Liquid/ Chemical									
Solvents									
Aromatic Aliphatic Halo-genated	Reduce quantity used by developing micro procedures	1	1	Segregate solvent wastes Use off-site commercial solvent recycling operations where quantities warrant or contact Waste Exchanges for reuse (i.e. in paint industry)	1	1	1	1	Laboratories
	Install on-site distillation equipment for reuse on-site	1/2	1/2						
Formalin for Tissue Proser-vation	Use substitutes for temporary tissue preservation (i.e. cold physiological saline or other commercially available materials)	1	1						Laboratories
	Take smaller samples which require less preservative\	1	2						

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site				Major Sources in Hospital
		Tech	Infras.	Internal Infras.	Potential Transport	Technol	Markets	
Formalin Used in Disinfection of Dialysis Equipment	Reuse formalin from specimens by development of on-site filtering system to remove contaminants	3	3					Patient Services
	Reduce formalin wastewater emissions by using additives to precipitate formaldyde from solution before discharge	1	1					
	Reduce quantity used by clearly establishing maximum concentrations & frequency of use	1	1					
	Replace formalin with less toxic materials commercially available	1	1					

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site	Potential				Major Sources in Hospital
		Tech	Infras.		Internal Infras.	Transport	Technol	Markets	
Other									
Chloro-fluoro-carbon (CFC) in Equipment	Replace high ozone depleting potential with less harmful CFCs (i.e. CFC22)	1/3	1	Recycle CFCs which continue to be used by instructing contractor to do it; or purchase own recovery equipment	1	1	1	1	Support Services
Anaes-thetic Gases				Capture and recycle anaesthetic gases via use of Delta 115 molecular sieve	1	2	2	2/1	Patient Services
Sterilant Gases Ethylene Oxide/ CFC	Reduce quantity used by making sure units are full before using	2	2	Install capture & recovery technologies for Eto/CFC12 for as long as regulations allow, and then for substitute materials	2	1	2	2	Support Services
	Reduce usage of materials requir-ing sterilization with ethylene oxide/ CFC12 by replacing with items which can be steam sterilized where available	2/3	2/3						

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site	Potential				Major Sources in Hospital
		Tech	Infras.		Internal Infras.	Transport	Technol	Markets	
	Replace Eto/CFC12 sterilization with other technologies	2/3	2/3						
	Replace CFC12 as carrier with other materials	2/3	2/3						
Misc. Waste Organic & Inorganic Chemicals	Purchase smaller quantities to reduce prospect of expired quantities	1	1	Set up internal waste exchanges for lab chemicals which may be still useful to someone else (i.e. Universities)	1	2	1	2	Laboratories
Mercury	Reduce mercury usage in hospital by using more electronic based equipment (e.g. thermometers)	1	1	Recycle waste mercury to rerefining companies	1	2	1	1	Support Services
	Reduce battery disposal by using rechargeables where suitable	1	1	Recycle batteries where markets warrant (i.e. silver, mercury, nickel)	1/2	2	1	1	

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site	Potential				Major Sources in Hospital
		Tech	Infras.		Internal Infras.	Transport	Technol	Markets	
	Reduce quantity of fluorescent lamps used in hospital by turning lights off where not required, evaluating lighting requirements	1	1						
	Purchase longlife light bulbs which require fewer changes	1	1	Keep up to date on new recycling markets for batteries and fluorescent lights					
Waste Oils	Investigate use of filters to extend life of oils	1	1	Recycle oils (i.e. vegetable or hydraulic) to commercial recyclers	2	1	1	2	Support Services
Petroleum Distillate	Investigate use of water based paints which do not require solvents for cleanup	1	1	If large quantities are available, then send to recyclers	2	2	1	2	Support Services
Photographic Chemicals	Reduce spoilage of chemicals by using proper storage	1	1	Recycle photographic film for silver recovery at off-site recyclers	2	2	1	2	Patient Services

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site	Potential				Major Sources in Hospital
		Tech	Infras.		Internal Infras.	Transport	Technol	Markets	
	Photographic bath life may be extended by adding the necessary chemicals (requires extra time and analysis) Reduce wastewater usage with counter-current rinsing (requires extra space)	1	1/2	Recover silver from fixer solution using on-site machine or off-site commercial recovery operations	2	2	1	2	
Detergents Disinfectants	Reduce wastage by purchasing only what is required	1	1						Support Services
	Replace hazardous cleaning agents (i.e. phenols) with more benign materials where possible	1	1						
Pesticides/ Herbicides	Reduce quantity in application where possible	1	1						
	Replace with biological controls where possible	1	1						

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site	Potential				Major Sources in Hospital
		Tech	Infras.		Internal Infras.	Transport	Technol	Markets	
Misc. Materials									
Waste Paints	Reduce hazardous wastes by replacing oil & enamel based paints where possible with latex paints	1	1	Paint recycling is becoming more popular. Investigate whether this service is offered in your area	1	2/3	1	1/2	Support Services
Sewered Macerated Food Wastes	Reduce quantity of suspended solids & Biological Oxygen Demand from being sewered by making sure macerators are operating efficiently	1	1						Support Services
	Incorporate additional screens to capture more suspended solids	1	1						
Pressurized Cylinders	Purchase only cylinders that are returnable to suppliers	1/2	1						Support Services
Drums	Purchase chemicals in returnable drums	1/2	1	Collect drums for recycling	1	1/2	1	1/2	

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site	Potential				Major Sources in Hospital
		Tech	Infras.		Internal Infras.	Transport	Technol	Markets	
Confidential Shredded Waste	Employ electronic information systems where possible	1	2	Use recyclable paper & shred material on-site for addition to on-site paper recycling program	1/2	1	1	1	Admin/Support Services & all over
				Have material shredded by contractor who recycles material for you	1/2	1/2	1	1	
Radioactive Materials	Reduce quantity of radioactivity by allowing for on-site decay	1	1	Request non radioactive outer containers as returnable/ recyclable materials & request supplier to take them back, i.e. lead container or plastic containers, or send to commercial recycler	1	2	1	3	
	Reduce hazard of materials by employing materials with shorter half lives where possible	1/2	2						
	Return containers to suppliers	1/2	1/2						

Table 6 (Contd.)

Material Type	Reduction, Reuse On-site	Potential		Reuse & Recycling Off-site	Potential			Major Sources in Hospital
		Tech	Infras.	Internal Infras.	Transport	Technol	Markets	
Pharma-ceuticals	Where out of use material may still be reusable, investigate for outside agency to take them	1/2	1					
	Purchase only as required to reduce out of date material	1	1					
	Reduce contact of packaging material, etc. with chemo-therapy waste to reduce the quantity requiring secure disposal	1	1					
	Return outdated drugs to manufacturers	1	1					

1.1.6 Form 26: Selected Potential Waste Reduction, Reuse or Recycling Programs

Based on the evaluation of these first 5 issues, you should now detail which reduction reuse or recycling programs you have identified as having priority for implementation at your hospital and list them on Form 26.

For Example, at Hospital A:

Material type:		Cardboard
Activity:		Recycling
Locations affected:	Support services:	Inventory and receiving
		Kitchen (dietetics)
	Patient Care:	Product delivery throughout the building
Estimated Quantity Diverted (calculation from Table 6)		160.6 tonnes/yr

Once you have these potential programs established, the financial evaluation of programs selected should be calculated.

FORM 26 - SELECTED POTENTIAL WASTE REDUCTION, REUSE OR RECYCLING PROGRAMS

Material Type	Activity	Locations Affected	Estimate Quantity Diverted

1.1.7 Financial Implications

For each selected potential reduction, reuse or recycling initiative, a financial analysis should be completed. It is important to compare the costs of a new initiative with current costs to ensure that the change makes economic sense. Should the new initiative have significant costs associated with it, you may wish to explore sources of funding and support through government programs, and suppliers.

Each facility will have its own unique issues when evaluating the financial implications. In most cases, the full "environmental cost" accounting has not yet been determined (i.e. disposable versus reusable diapers), but, in many cases, specific local environmental impacts may take a priority (i.e. in areas of acute water shortages, disposable diapers may be favoured).

Review the 4 examples provided for calculating the financial implications of selected waste minimization initiatives and calculate the costs to your facility for the programs selected.

Please keep in mind that these are sample calculations only. Interest rates have been estimated at 10% per annum to facilitate a simple calculation, and amortization rates have been artificially selected as well. The cost effectiveness of various options open to your hospital will need to be determined through assessment, according to the general accounting procedures used by your finance department. Several "standard" accounting procedures are available for your use.

Specific costs for recycling programs should be worked out in conjunction with a number of potential recycling companies, if available. For waste reuse programs, suppliers and service companies (i.e. laundries) need to be contacted for specific costs. For waste reduction initiatives, suppliers should be able to provide costing examples for you.

Once these cost calculations have been conducted, you will be able to select the appropriate waste management programs for your facility.

Sample Financial Calculations for Selected Recycling, Reuse and Reduction Initiatives

Example 1: Cardboard Recycling

Hospital A Data:

# of beds:	529
Total general waste disposed:	1,217 tonnes/yr
Type of container:	Compactor
Revenue from sale of cardboard:	0

Cardboard Waste Generation:

Cardboard disposed:	160 tonnes/yr
Kraft paper disposed:	2.04 tonnes/yr (kraft can be recycled with cardboard in small quantities)
Total recyclable:	162 tonnes/yr
% of total general waste:	13.5%

Estimated Current General Waste Disposal Costs:

Disposal cost/year (lift fee + disposal): (Other costs, such as labour, utilities to operate garbage room, etc., will not change significantly)	$72,800
Total General Waste Disposal Costs:	$72,800
Cardboard Waste Disposal Costs:	13.5% of general waste = $9,828

Recycling Option

(a) Manual Flattening

Estimated labour:	3 hrs to flatten 400 kg
∴ To flatten 162 tonnes requires:	1,215 hrs
Estimated labour costs:	$12/hr x 1,215 hrs = $14,580
Cost of collection bins:	Supplied by recycler
Total Costs:	**$14,580/yr**

Example 1 (contd)

(b) Baling

Capital cost of baler:	$11,100 (new)
Costs, including interest @ 10% per annum, amortized over 5 years: (assume storage space available)	$3,330/yr
Amortized over 3 years:	$4,810/yr
Operation of baler:	Estimated 1 hr/day of labour = 1 hr/day x 365 days/yr = 365 hrs/yr
Labour costs to operate baler:	Assume labour rate of $12/hr = $12/hr x 365 hrs/yr = $4,400/yr
(assume storage space for 1-2 bales/day (180-250 kg each) available till pick-up by recycler)	
Total Costs: (using 5 year amortization period)	= capital cost + labour costs = $3,330/yr + $4,400/yr = $7,730/yr
(using 3 year amortization period)	= $4,810/yr + $4,400/yr = $9,210/yr

Potential savings to Hospital A is greatest when baler is used. This option can save Hospital A between $600 and $2,000 per year.

Sample Financial Calculations for Selected Recycling, Reuse and Reduction Initiatives

Example 2: Biomedical Waste:Placenta Recycling

Hospital A Data:

# of births:	3,351/yr
Estimated anatomical waste disposed:	7.3 tonnes/yr

Quantity of Placentae:

Estimated # of placentae (i.e. 1 per birth)	= 3,351
Total weight of placentae disposed	= 3,351 x 0.45 kg. = 1,508 kg/yr
% placentae of anatomical waste disposed:	1,508/7,300 kg x 100 = 20%

Current Anatomical Waste Disposal Costs:

Actual disposal cost:	$0.452/lb x 7,300 kg x 2.2 lb/kg = $7,260
Pick-up fee:	$52/pick-up x est. 52 pick-ups = $2,704
Cost of boxes & bags:	est. $100
Other costs (cold room, labour, utilities, maintenance, etc., assume not to change significantly if placentae picked up separately)	
Total cost to dispose anatomical wastes:	= $10,064/yr
Total cost to dispose placentae as anatomical wastes (~ 20%)	= $2,013/yr

Cost of Placenta Recycling

Cost of small refrigeration unit to deep freeze placentae:	$0 (supplied by recycler)
Cost of special paraffin boxes:	$0 (supplied by recycler)
Cost of pick-up:	$0 (supplied by recycler)
Cost of storage space, utilities:	Assume easily available for small units

Example 2 (Contd.)

Cost of participation to hospital:	$0
Revenue generated by contracting for service:	$0.35/placenta x 3,351 placentae/yr = $1,173

∴ Total savings to Hospital A by initiating placenta recycling program:

Reduced disposal costs:	$2,013
Revenue from contracting service:	$1,173
Total Benefit:	**$3,186**

Sample Financial Calculations for Selected Recycling, Reuse and Reduction Initiatives

Example 3: Use of Reusable Diapers

Hospital A Data:

# of births/yr:	3,351
Annual weight of general waste:	1,216 tonnes/yr
Cost of general waste disposal:	$72,800/yr
Usage of small and premature diapers:	198,000 units

Disposable Diapers:

Diaper Purchasing Costs

	Total Purchased	Estimated Cost per diaper	Total Cost
Small	108,000	15.7¢	$16,992
Premature	90,000	8.6¢	7,755

Total Purchasing Costs: $24,747/yr

Diaper Disposal Costs:

# of diapers:	198,000
Estimated weight of soiled diaper:	0.2 kg
Total weight (estimated)	0.2 x 198,000 = 39,600 kg/yr (3.3% of total general waste)

Secondary Packaging (cardboard):

Small diapers	3,600 boxes x 0.2 kg box = 720 kg
	450 cases (8 boxes/case) x ~ 1 kg/case = 450 kg
Total of cardboard	= 1,170 kg (OCC)

Example 3 (Contd.)

Premature diapers	1,500 boxes x 0.1 kg/box = 150 kg 250 cases (6 boxes/case) x 1 kg/case = 450 kg
Total of cardboard	= 400 kg
Total Secondary Packaging	1,170 kg + 400 kg = 1,570 kg annually of cardboard = (0.13% of total general waste)
Total % weight of general waste disposed (i.e. diapers + packaging)	= 3.4%
Estimated disposal costs: (diapers plus packaging)	3.4% of $72,800 = $2,475/yr
Total Disposal Costs:	$2,475/yr
Total Purchasing and Disposal Costs:	$27,222/yr

Reusable Diapers

Estimated 70 uses per diaper

Diaper Purchasing Costs

	Total Purchased	Estimated Cost per Diaper ($)	Total Cost Ranges ($)	Total Purchase Costs amortized over 2 years (for lowest cost)
Small	5,000	1.09 - 4.50	5,450 - 22,500	$2,725
Premature	1,000	0.84 - 4.50	840 - 4,500	$420

Total Purchasing Costs: $3,145/yr

Example 3 (Contd.)

Diaper Cleaning Costs: Using Services of Central Laundry

	Central Laundry Costs for Water, Utilities, Detergents, Handling, Pick-up Services, Collection Bags per diaper	Total Annual Costs
Small diapers (est. wt = 42 g empty, 84 g with urine)	$0.08	(@ 108,000 uses) $8,640
Newborn diapers/premature (est. wt = 34 g empty, 68 g with urine)	$0.07	(@ 90,000 uses) $6,300
Total Usage Costs/year		$14,940

Total purchasing and usage costs: = $3,145 + $14,940
= $18,085

∴ For Hospital A, it is more economical to use reusable diapers which will save hospital $9,000 annually.

Sample Financial Calculations for Selected Recycling, Reuse and Reduction Initiatives

Example 4: **Reducing the quantities of medical dressing trays waste by replacing with units sterilized on site.**

Hospital A Data:

# of beds:	529
#of dressing trays for AKU (usage per year):	20,676
Cost of Reusable System:	
Materials (disposable)	
Autoclave Tape	$0.01/unit
Radiopaque Clamp	$0.1/unit
Gauzes	$0.36/unit
Total Materials (disposable)	$0.47/unit
Materials (reusable + sterilizing cost)	
Linen wraps	$0.72/unit
Instruments	$0.06/unit
Total Materials (reusable)	$0.78/unit
Total Cost of Reusable (sterilizing) & Disposable Materials per unit	$0.47 + 0.78 = $1.25
Labour	
Tray prep.,4 mins.@ $16.53/hr	$1.10
Tray cleaning 4 mins @ $15.19/hr	$1.01
Total Labour per unit	$2.11
Total Materials and Labour Costs per Unit	$3.36 per tray
Total Annually	$69,471

Example 4 (Contd.)

Cost of Disposable System:

Materials (disposable)	$3.36 per unit
Total Cost of Materials Annually (with 20,676 usages)	$69,471

Disposal Costs:

	Unit Wt	Annual Wt
Weight of Tray Assembly	0.15 kg	3,010 kg
Weight of Secondary Packaging (cardboard) which holds 20 units (i.e. 1,034 units)	0.75 kg	775 kg
Total Weight of Disposable Items		3,876 kg
	(or 0.32% of Total General Waste)	
Estimated Disposal Costs	0.32% of $72,800 $233	
Total Purchasing and Disposal Costs	$69,704	

∴ For Hospital A, it is more economical to sterilize on-site and have a reusable system for their dressing trays. This will save the hospital $233 per year.

2. IMPLEMENTATION

Having established which reduction, reuse or recycling opportunities make sense, and having assessed, in detail, the financial implications of those that appear the most promising, the next step is to develop an initial implementation plan.

The suggestion that this be an "initial plan" is made because things are moving very rapidly in hospital waste management at the present time. Disposal fees are escalating very quickly and more and more municipalities are instituting bans on specific materials going to landfill. Do not discard any notes on possible reduction, reuse and recycling opportunities judged to be uneconomical at this time. That may change next year or in 2 or 3 years' time.

2.1 Involve Staff at the Hospital

Again, as in the initial assessment of waste minimization opportunities, get the people, who will be affected by any changes, involved. Ask for, **and use** good suggestions on the most practical ways to make things work. Make sure people know why you want to do things differently; what this will achieve in terms of avoiding waste going for disposal; and benefits to the environment. People are interested.

The reason for this continued stress on involving people is twofold. First, they truly will provide the most practical suggestions for implementation, and, second, if they have had meaningful input, they have a stake in making things work.

2.2 Develop a Reporting Format: The Implementation Plan

When you have decided on the things you want to implement and how this should be done, put together a report seeking the approval of senior management. It is not possible to detail how this should be done, as each hospital has different protocols for approving changes. Perhaps in some hospitals, the Environmental Committee has full approval authority for spending

up to a certain ceiling. In others, this Committee may only have a technical review mandate. If product or procedural changes are required, it may require the approval of the Purchasing and Standardization Committee.

Any Implementation Plan may include some, or all of the following:

1. A detailed description of the change(s) (e.g. collection, storage of recyclables)
2. A description of the benefits of making these changes
3. A recommendation for capital investment
4. A recommendation for manpower and other non capital expenditures
5. An analysis of cost/benefit; contracts for sale of recyclables
6. A review of potential funding programs to offset costs
7. An implementation schedule and strategy
8. Program monitoring strategy
9. Promotion and education.

Approval requirements for implementation of the various elements of the Plan will differ for each hospital. Capital allocation may require another approval mechanism and Manpower and Operating Costs another mechanism. Once all approvals are in place, it is time to implement.

In drawing up the implementation schedule and strategy, "slower and surer" is more likely to be successful in the long run. Do not try to have everything in place on day one. If it makes sense, phase in implementation. For example, if a decision is made to collect and bale corrugated cardboard, and it is known from the audit that 80% of the cardboard comes from 1 or 2 areas, start here. When the system works well in the two areas, then go after all, or some of the other 20% that might come from many different areas. This can be written up as part of the strategy. However, the more gradual implementation gives an opportunity to make minor adjustments to the suggested method of operation without confusing too many people.

Even after all of the initial opportunities have been implemented, a continuous review to improve the workability of these systems should be undertaken. As economics or regulatory climates change, the feasibility of implementing other waste minimization opportunities should be reviewed. You should work to make sure that the feasibility of implementing these additional opportunities has not been impaired by earlier changes.

2.3 Program Promotion

The success of any waste minimization program relies very heavily on the participants' support and cooperation. It is, therefore, very important to promote the program to staff and provide information on how and why they should participate. External promotion to the surrounding community may also be beneficial in recruiting more volunteers, if required. Contact your local municipality or provincial recycling organization for educational and promotional information.

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APPENDIX 1: DETAILED ESTIMATION OF WASTE TYPES GENERATED PER AREA USING WASTE FACTORS AND ACTIVITY LEVELS (kg/yr)

DETAILED ESTIMATION OF WASTE TYPE GENERATED PER AREA USING WASTE FACTORS AND ACTIVITY LEVELS

The following charts have been prepared from the information ORTECH obtained from conducting a detailed waste audit at Ottawa General Hospital. The 'Waste Factors' are relationships between the activity that results in waste being produced and the type and quantity of waste produced. These factors can be used to calculate detailed estimations of waste generation per area in other average hospitals, to give annual quantities in kg/yr for both general waste (pp 160-183) and biomedical (pp 184-187).

Procedure

(1) Complete Part A of the Manual to determine current waste generation quantities. In Form 2 complete the information regarding the activity level for each area as indicated and record this information under Activity Level in Appendix 1. If you have already compiled this information for your hospital, simply complete Forms 2 and 16.

(2) Confirm that your facility is average with respect to waste generation and activity by completing Part B, Section 1. If your facility does not fit the "average" description of a hospital, you may still choose to use the information in this section, with caution, or you can refer to the Companion Document for further guidance.

(3) Determine which areas within your facility for which you will calculate detailed estimates of waste generation using the charts in Appendix 1.

(4) Calculate the Annual Waste (AW) generated for specific waste materials per specific areas. Use the Waste Factors (WF) given for each section in a specific area and multiply by your Activity Level to obtain the Annual Waste in kg/yr.

At Hospital A:

beds occupied in Obstetrics = 49.5

∴ Quantity generated per year:

Boxboard	= 49.5 x 8.2 (WF)	= 406 kg/yr (AW)
Fine Paper	= 49.5 x 3.7 (WF)	= 183 kg/yr (AW)
Newspaper	= 49.5 x 27.3 (WF)	= 1,351 kg/yr (AW)
Cardboard	= 49.5 x 6.1 (WF)	= 302 kg/yr (AW)
Total potentially recyclable paper	= 49.5 x 45.3 (WF)	= 2,242 kg/yr (AW)

You may use these estimations with caution to predict waste generation rates of materials that could be available for recycling programs. Keep in mind that modifications internally in your hospital may affect the generation areas for these waste materials.

Glossary of Terms

Activity Descriptors: The type of activity which can best be related to waste generation (e.g. # of beds occupied, # of surgeries, # of staff per section).

Activity Levels: The level of waste generating activity.

AW: Annual waste quantity in kg/yr of specific waste materials, calculated from waste factors (WF) and your activity levels (i.e. activity level/yr x waste factor [kg] = annual waste [kg/yr]).

BoroS/Glass: Borosilicate glass, i.e. most laboratory glassware, currently non recyclable.

CPO/Paper: Computer printout.

Decontam: Decontamination area used for cleaning food containers and supplies, and operating materials and supplies.

Food: All food wastes and other organic materials such as flowers (does not include yard waste).

Food/Cont./Plastics: Disposable food containers (e.g. juice) or other non medical containers (e.g. soaps, cleansers, etc.)

Food/Metal: Disposable aluminum or steel food and beverage containers.

Gen:Med: General Medicine.

Gloves/Plastic: Includes both latex and polyvinylchloride gloves.

Hairnets/Paper: Represents the disposable hair, food and mouth, etc., coverings (generally rayon or polyester).

ICU: Intensive Care Unit.

Incont/Paper: Adult incontinence.

Kraft/Paper: Brown wrapping paper.

Medical/Metal:	Disposable metal medical implements, e.g. clamps, scalpels (without blades).
Medical/Plastics:	Includes all plastics used in medical procedures or patient treatment (e.g. tubing, intravenous bags, medical solution containers, etc.). Only a small number of commercial recyclers are currently recycling some of this material.
Med.Ster./Paper:	Medical sterile packaging, generally mult-material, e.g. tissue and film plastic packaging.
MIS:	Management Information Systems.
Misc.:	Miscellaneous materials such as equipment, wood waste, textiles, and personal items such as running shoes, etc.
Non Recy/Paper:	Other currently non-recyclable paper materials, e.g. milk cartons, waxed papers, other treated papers.
Non Recyclable:	Waste materials that currently are not in wide demand by commercial processors, e.g. medical plastic materials potentially contaminated with body excretions.
Occ (OCC):	Old corrugated cardboard.
Packaging/Plastic:	Primarily film packaging, (e.g. polyethylene).
Recyclable:	Waste materials that are currently in wide demand by commercial processors (for this study, recyclable implies potentially recyclable and depends on local availability of markets).
SPD:	Supply Purchasing and Distribution.
WF:	Waste Factors, determined from a detailed waste audit conducted at Ottawa General Hospital. See Companion Document for further information.
Wet. Pap/Gz./Paper:	Wet paper (e.g. tissue from washrooms, etc.) and gauzes (used in patient treatment, etc.).

General Waste Generation per Activity (kg/yr/Activity Descriptor)

Sections	Activity Descriptor	Activity Level	Paper													
			Potentially Recyclable													
			Boxboard		CPO		Fine		Kraft		Newspaper		OCC		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Care																
Cancer Lodge	Beds		21.7		0.0		8.4		1.3		20.3		0.0		51.8	
Gen. Med. (Gerontology/Rheum.)	Beds		10.6		3.1		11.6		0.0		6.2		20.7		52.4	
Gen. Med. (Hem./Oncology)	Beds		13.0		6.2		10.0		1.1		17.1		37.7		85.1	
Gen. Med. (Nephrology)	Beds		7.8		7.1		13.2		0.9		11.7		37.2		77.9	
Gen. Med. (Pulmonary, Cardio)	Beds		11.4		1.5		5.2		0.0		10.1		24.4		60.7	
Gynecology	Beds		3.1		0.3		4.8		0.0		2.1		0.1		10.5	
Intensive Care Unit (ICU)	Beds		54.0		45.7		14.0		0.0		3.9		38.8		156.4	
Neurology (Neuro ICU)	Beds		10.7		0.0		1.0		0.0		0.0		15.7		27.4	
Neurology (Neurosurgery)	Beds		7.9		2.2		1.8		0.2		2.1		10.6		24.8	
Neurology (Offices,Clinics)	Staff		2.2		0.0		97.6		0.0		0.0		78.7		178.4	
Neurology (Vascular Neurology)	Beds		15.0		3.3		4.5		1.0		11.8		24.2		59.8	
Nursery	Beds		14.4		0.8		2.9		0.2		0.0		204.6		222.9	
Obstetrics	Beds		8.2		0.0		3.7		0.0		27.3		6.1		45.3	
Ophthalmology/Urology	Beds		28.9		3.1		12.4		2.4		39.5		2.3		88.5	
Orthopedics	Beds		10.8		3.9		6.9		0.0		7.8		2.5		31.8	
Patient Check Out	Beds		6.6		0.0		4.0		0.0		0.0		0.0		10.6	
Psychiatry (Beds)	Beds		1.5		0.0		4.2		0.0		5.6		2.3		13.5	
Psychiatry (Offices)	Offices		0.9		3.1		24.5		0.3		0.0		0.0		28.8	
Short Stay Unit	Beds		3.5		0.4		8.2		0.0		10.3		0.0		22.2	
Surgery (General,Thoracic)	Beds		10.3		7.2		50.2		2.4		42.4		42.6		155.1	
Surgery (Plastic/General)	Beds		13.8		5.3		6.9		1.9		27.9		42.0		97.7	

* WF = Waste Factor

+ AW = Annual Waste Quantity Calculated from Waste Fact or and Your Activity Level (kg/yr/Activity Descriptor)

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Paper													
			Potentially Recyclable													
			Boxboard		CPO		Fine		Kraft		Newspaper		OCC		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Laboratories																
Biochemistry	1000 Samples		0.3		0.5		0.3		0.0		0.7		2.1		3.9	
Blood bank	1000 Samples		0.0		0.0		0.3		0.0		0.0		0.6		0.9	
Hematology	1000 Samples		0.8		1.8		0.8		0.0		0.0		3.4		6.8	
Microbiology/Infection Control	1000 Samples		3.0		31.6		37.2		0.0		0.0		26.0		97.8	
Oncology (Cancer Lab)	Staff		5.1		5.4		9.7		1.4		4.8		10.0		36.3	
Pathology	1000 Operations		36.3		0.0		5.8		1.7		0.0		79.9		123.7	
Morgue	Autopsies		0.3		0.0		0.0		0.0		0.0		1.0		1.3	
Research Lab	Staff		0.0		0.0		0.4		0.0		0.0		5.8		6.2	
Stat Lab	Staff		19.4		691.6		19.7		29.6		32.6		82.0		874.9	
Administration																
Admissions	1000 Patients		4.3		355.6		46.4		0.0		0.0		39.7		446.0	
Finance, Admin, Other Offices	Staff		0.1		6.7		34.3		0.0		3.0		7.6		51.7	
Health Services	Staff		0.4		0.0		34.6		3.1		0.0		0.0		38.1	
Human Resources, Other Offices	Staff		0.0		0.4		2.3		0.0		0.2		0.4		3.3	
Locker Rooms	Staff		0.0		0.0		0.1		0.0		0.0		0.0		0.1	
MIS	Staff		0.1		14.2		5.1		0.1		0.1		54.3		73.9	
Medical Records	Staff		0.1		0.1		72.6		0.0		2.7		4.9		80.4	
Library	Staff		1.0		3.5		65.1		0.0		29.4		15.7		114.7	
Physicians Office	Staff		0.0		0.0		0.1		0.0		0.0		0.0		0.2	
Physicians Office, Waiting Rm	Staff		1.7		0.1		26.2		0.2		4.6		0.4		33.3	
Purchasing	Staff		3.8		74.8		44.5		1.8		0.0		0.0		124.9	
Residents Lodging	Beds		17.4		0.0		4.7		1.1		16.3		28.1		69.6	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Paper													
			Potentially Recyclable													
			Boxboard		CPO		Fine		Kraft		Newspaper		OCC		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Services Diagnostic																
Cardiopulmonary	1000 Procedures		1.1		1.5		22.5		0.0		1.3		1.2		27.6	
Gastrointestinal Unit	1000 Procedures		42.9		28.1		16.3		1.9		0.0		0.0		81.3	
Neurophysiology	1000 Patients		3.6		408.2		16.1		0.3		0.0		0.5		428.7	
Nuclear Medicine	1000 Patients		5.1		2.8		25.4		0.0		9.0		0.0		42.3	
Obstetrics/Ultrasound	1000 Patients		14.1		0.0		27.4		0.7		0.0		8.6		50.7	
Ophthalmology	1000 Patients		4.5		0.2		17.3		0.0		0.0		13.5		35.6	
Radiology	1000 Exams		5.3		10.6		22.7		1.6		5.5		4.7		50.4	
Patient Services Service																
Biomedical Engineering	1000 Repairs		1.3		0.0		0.3		0.0		0.0		1.3		2.9	
Cancer Clinic	1000 Patients		16.5		1.5		35.6		1.0		2.2		15.2		71.9	
Dialysis	1000 Patients		98.1		0.0		12.4		0.0		9.2		333.3		453.1	
Emergency	1000 Patients		21.7		0.9		38.1		1.5		2.3		13.0		85.5	
Fertility Clinic	1000 Patients		11.8		1.0		34.5		0.6		0.0		0.0		47.9	
Labour and Delivery	1000 Deliveries		153.5		0.0		221.2		0.0		177.5		355.0		907.2	
Pharmacy	1000 Doses		0.1		0.0		0.0		0.0		0.0		1.5		1.5	
Recovery, Anaesthesia	1000 Operations		13.7		1.4		62.0		0.0		3.8		8.5		89.4	
Surgery	1000 Operations		106.9		0.0		6.9		0.0		0.0		84.8		198.6	
Patient Services Therapeutic																
Audiology	1000 Procedures		3.0		0.0		28.9		0.0		0.0		0.0		31.9	
Occup. and Physio. Therapy	1000 Patients		1.0		1.5		14.0		0.5		0.2		8.3		25.4	
Psychology/Psychiatry Off./Clinic	1000 Patients		39.3		7.6		459.9		3.9		43.4		38.6		592.7	
Respiratory Therapy (Office)	Staff		2.5		0.0		2.6		0.2		0.0		11.6		16.8	
Social Work	Staff		10.2		48.1		258.7		0.0		0.0		73.4		382.4	
Speech Therapy	1000 Patients		18.0		2.7		24.7		0.0		0.0		0.0		45.4	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Paper													
			Potentially Recyclable													
			Boxboard		CPO		Fine		Kraft		Newspaper		OCC		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Support Services																
Coffee Shop	Staff		0.0		0.0		88.3		53.6		48.1		16.9		198.9	
Decontam	1000 meals		0.7		0.0		0.0		0.0		0.0		1.2		1.8	
Decontam (OR Waste)	1000 Operations		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Decontam (Packaging Waste)	1000 meals		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Dietetics	1000 meals		1.7		0.0		0.0		0.3		0.3		21.4		23.7	
Drug Store (Pharmacy)	Staff		1.1		0.0		0.5		0.0		0.3		0.0		2.0	
Dry Cleaning	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Engineering	Staff		18.2		0.5		1.1		0.5		0.0		16.3		36.9	
Housekeeping	Staff		0.8		0.0		0.0		0.0		0.4		1.0		2.2	
Inventory Control	Staff		154.6		34.3		933.7		0.0		39.8		3799.0		4963.4	
Receiving	Staff		1338.8		4.0		27.6		69.9		21.4		997.8		2451.5	
SPD Office	Staff		13.8		11.0		283.0		0.0		12.0		0.0		320.7	
Store (La Boutique)	Staff		124.6		30.7		0.0		0.0		696.3		0.0		851.7	
Telecommunication	Staff		0.0		0.0		17.7		0.0		0.0		42.1		59.7	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Paper																	
			Potentially Non-Recyclable																Total Paper	
			Diapers		Incont.		Underpads		Non-Recyc.		Wet Pap/Gz		Med. Ster.		Hairnets etc		Total			
			WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Care																				
Cancer Lodge	Beds		0.0		0.0		0.0		48.4		43.9		0.0		2.7		86.9		138.7	
Gen. Med. (Gerontology/Rheum.)	Beds		0.0		323.4		58.1		12.9		88.9		10.1		0.2		493.6		545.9	
Gen. Med. (Hem./Oncology)	Beds		0.0		48.6		54.0		12.2		111.1		44.2		3.0		265.1		350.2	
Gen. Med. (Nephrology)	Beds		0.0		42.2		35.7		24.5		103.2		10.9		0.9		217.3		295.2	
Gen. Med. (Pulmonary, Cardio)	Beds		0.0		273.2		18.3		14.1		89.1		10.3		0.8		397.8		458.4	
Gynecology	Beds		0.0		134.9		19.8		7.4		44.0		6.2		0.0		212.4		222.8	
Intensive Care Unit (ICU)	Beds		0.0		61.3		135.8		2.7		181.5		58.4		5.8		445.5		601.9	
Neurology (Neuro ICU)	Beds		0.0		249.9		47.3		8.5		113.6		10.1		1.3		430.7		458.1	
Neurology (Neurosurgery)	Beds		0.0		123.6		21.4		8.1		72.7		6.3		0.6		232.7		257.5	
Neurology (Offices,Clinics)	Staff		0.0		0.0		0.0		472.4		0.0		0.0		0.0		472.4		642.8	
Neurology (Vascular Neurology)	Beds		38.4		114.6		69.0		11.2		108.9		15.7		0.7		358.5		410.3	
Nursery	Beds		603.5		0.0		0.0		1.1		56.8		29.3		0.4		691.1		914.0	
Obstetrics	Beds		3.3		11.5		39.3		6.6		94.0		7.1		0.0		161.8		207.0	
Ophthalmology/Urology	Beds		0.0		0.0		36.9		18.3		82.7		11.1		0.2		149.2		229.7	
Orthopedics	Beds		0.0		34.7		68.9		12.0		78.0		9.2		2.4		206.2		238.0	
Patient Check Out	Beds		0.0		0.0		43.8		3.3		51.2		6.2		0.0		104.5		115.1	
Psychiatry (Beds)	Beds		0.0		78.0		4.2		15.4		28.3		1.8		0.4		128.1		133.6	
Psychiatry (Offices)	Offices		0.0		0.0		0.0		18.1		11.9		0.0		0.0		30.0		58.7	
Short Stay Unit	Beds		0.0		0.0		5.7		1.8		5.2		1.8		1.9		16.4		38.6	
Surgery (General,Thoracic)	Beds		0.0		62.2		17.6		14.6		97.7		6.8		0.0		218.8		373.9	
Surgery (Plastic/General)	Beds		0.0		35.8		35.4		11.9		134.2		24.1		1.5		242.8		348.5	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Paper																	
			Potentially Non-Recyclable																Total Paper	
			Diapers		Incont.		Underpads		Non-Recyc.		Wet Pap/Gz		Med. Ster.		Hairnets etc		Total			
			WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Services Diagnostic																				
Cardiopulmonary	1000 Procedures		0.0		0.0		0.0		1.7		4.6		0.8		0.0		7.1		34.7	
Gastrointestinal Unit	1000 Procedures		0.0		0.0		14.5		28.9		231.3		121.3		0.9		396.9		478.1	
Neurophysiology	1000 Patients		0.0		2.6		0.0		13.0		28.2		3.5		0.0		47.2		474.0	
Nuclear Medicine	1000 Patients		0.0		0.0		0.0		4.9		4.8		5.5		0.0		15.2		57.5	
Obstetrics/Ultrasound	1000 Patients		0.0		0.0		3.1		51.5		96.7		18.9		0.0		170.2		220.9	
Ophthalmology	1000 Patients		0.0		0.0		0.0		4.0		14.3		1.8		0.0		20.9		56.5	
Radiology	1000 Exams		0.4		0.0		3.6		5.6		10.2		2.5		0.2		22.5		72.9	
Patient Services Service																				
Biomedical Engineering	1000 Repairs		0.0		0.0		0.0		2.4		4.8		0.2		0.0		7.4		10.2	
Cancer Clinic	1000 Patients		0.0		0.0		6.5		48.4		27.0		5.3		0.4		87.6		159.5	
Dialysis	1000 Patients		0.0		0.0		38.5		18.2		404.5		136.5		44.0		641.6		1094.6	
Emergency	1000 Patients		0.0		1.4		38.9		78.3		181.1		23.3		0.1		315.1		488.7	
Fertility Clinic	1000 Patients		0.0		0.0		0.0		33.8		21.8		9.3		0.0		64.8		112.8	
Labour and Delivery	1000 Deliveries		0.0		0.0		386.0		516.3		909.0		268.3		83.4		2163.0		3070.2	
Pharmacy	1000 Doses		0.0		0.0		0.0		0.1		0.1		0.2		0.0		0.4		1.9	
Recovery, Anaesthesia	1000 Operations		0.0		0.0		13.6		7.3		34.1		28.4		15.8		91.2		188.6	
Surgery	1000 Operations		0.0		0.0		38.2		2.1		261.1		92.9		0.0		394.3		592.9	
Patient Services Therapeutic																				
Audiology	1000 Procedures		0.0		0.0		0.0		7.4		23.4		2.9		0.0		33.7		65.6	
Occup. and Physio. Therapy	1000 Patients		0.0		0.0		0.0		12.0		33.0		0.1		0.6		46.5		71.9	
Psychology/Psychiatry Off./Clinic	1000 Patients		0.0		0.0		0.0		179.6		59.7		0.0		0.0		239.3		832.1	
Respiratory Therapy (Office)	Staff		0.0		0.0		0.0		1.2		4.1		0.0		0.0		5.3		22.1	
Social Work	Staff		0.0		0.0		0.0		36.1		13.7		0.0		0.0		49.8		432.2	
Speech Therapy	1000 Patients		0.0		0.0		0.0		9.1		12.0		3.6		0.2		25.0		78.3	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Paper																	
			Potentially Non-Recyclable																Total Paper	
			Diapers		Incont.		Underpads		Non-Recyc.		Wet Pap/Gz		Med. Ster.		Hairnets etc		Total			
			WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Laboratories																				
Biochemistry	1000 Samples		0.0		0.0		0.0		0.0		0.6		0.0		0.0		0.6		4.6	
Blood bank	1000 Samples		0.0		0.0		0.1		0.0		0.3		0.0		0.1		0.6		1.5	
Hematology	1000 Samples		0.0		0.0		0.9		5.7		3.9		0.3		0.0		10.7		17.6	
Microbiology/Infection Control	1000 Samples		0.0		0.0		0.0		10.2		3.6		2.0		0.0		15.7		113.5	
Oncology (Cancer Lab)	Staff		0.0		0.0		0.0		28.4		9.0		0.0		0.0		37.6		75.9	
Pathology	1000 Operations		0.0		0.0		0.0		1.7		111.7		0.0		0.0		113.4		237.1	
Morgue	Autopsies		0.0		0.0		0.0		0.0		0.7		0.3		0.0		1.0		2.3	
Research Lab	Staff		0.0		0.0		1.9		21.3		15.1		0.0		0.0		38.4		44.6	
Stat Lab	Staff		0.0		0.0		19.3		251.7		108.7		0.0		0.0		379.7		1254.6	
Administration																				
Admissions	1000 Patients		0.0		0.0		0.0		57.0		8.7		0.0		0.0		65.7		511.7	
Finance, Admin, Other Offices	Staff		0.0		0.0		0.0		3.2		74.9		0.0		0.2		78.2		138.0	
Health Services	Staff		0.0		0.0		0.0		4.3		12.1		3.2		0.0		19.6		57.7	
Human Resources, Other Offices	Staff		0.0		0.0		0.0		0.2		5.0		0.0		0.0		5.2		6.5	
Locker Rooms	Staff		0.0		0.0		0.0		0.0		0.1		0.0		0.0		0.1		0.3	
MIS	Staff		0.0		0.0		0.0		3.4		1.1		0.0		0.0		4.5		78.4	
Medical Records	Staff		0.0		0.0		0.0		2.5		0.9		0.0		0.0		3.4		83.8	
Library	Staff		0.0		0.0		0.0		41.2		23.1		0.0		0.0		64.3		179.0	
Physicians Office	Staff		0.0		0.0		0.0		0.1		0.1		0.0		0.0		0.1		0.3	
Physicians Office, Waiting Rm	Staff		0.0		0.0		0.0		20.5		13.2		0.0		0.1		33.9		67.2	
Purchasing	Staff		0.0		0.0		0.0		41.3		4.8		0.0		0.0		46.1		171.0	
Residents Lodging	Beds		0.0		0.0		0.0		32.4		35.1		0.0		2.1		69.6		139.3	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Paper																	
			Potentially Non-Recyclable																Total Paper	
			Diapers		Incont.		Underpads		Non-Recyc.		Wet Pap/Gz		Med. Ster.		Hairnets etc		Total			
			WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Support Services																				
Coffee Shop	Staff		0.0		0.0		0.0		289.8		521.6		0.0		0.0		811.4		1618.3	
Decontam	1000 meals		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		1.8	
Decontam (OR Waste)	1000 Operations		0.0		0.0		0.0		0.0		193.5		193.5		0.0		386.9		386.9	
Decontam (Packaging Waste)	1000 meals		0.0		0.0		0.0		0.3		2.5		0.0		0.0		2.7		2.7	
Dietetics	1000 meals		0.0		0.0		0.0		1.5		3.1		0.0		0.0		4.6		28.3	
Drug Store (Pharmacy)	Staff		0.0		0.0		0.0		3.9		0.0		0.0		0.0		3.9		5.8	
Dry Cleaning	Staff		0.0		0.0		0.0		10.3		0.0		0.0		0.0		10.3		10.3	
Engineering	Staff		0.0		0.0		0.0		2.1		12.3		0.0		0.3		14.8		51.7	
Housekeeping	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		2.2	
Inventory Control	Staff		0.0		0.0		22.5		76.5		233.6		29.7		7.5		369.7		5333.1	
Receiving	Staff		0.0		0.0		0.0		54.5		34.1		2.0		0.0		90.6		2542.1	
SPD Office	Staff		0.0		0.0		7.2		24.6		75.2		9.6		2.4		119.0		439.6	
Store (La Boutique)	Staff		0.0		0.0		0.0		0.0		9.7		0.0		0.0		9.7		861.4	
Telecommunication	Staff		0.0		0.0		0.0		23.3		4.0		0.0		0.0		27.3		87.0	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Plastic															
			Non-Recyclable						Recyclable									
			Medical		Gloves		Total		Packaging		Food/Cont.		Polystyrene		Total		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Care																		
Cancer Lodge	Beds		0.0		0.0		0.0		16.5		14.3		5.7		36.5		36.5	
Gen. Med. (Gerontology/Rheum.)	Beds		24.0		15.4		39.5		24.2		3.5		4.9		32.5		72.0	
Gen. Med. (Hem./Oncology)	Beds		106.3		22.7		129.0		33.4		6.5		4.9		44.8		173.8	
Gen. Med. (Nephrology)	Beds		109.5		12.3		121.9		23.0		6.2		7.5		36.8		158.6	
Gen. Med. (Pulmonary, Cardio)	Beds		57.8		17.2		75.0		23.8		4.7		4.8		33.2		108.3	
Gynecology	Beds		24.9		9.4		33.3		14.0		6.7		1.9		22.7		56.0	
Intensive Care Unit (ICU)	Beds		342.2		79.8		422.0		27.2		4.2		4.9		36.4		458.4	
Neurology (Neuro ICU)	Beds		53.6		28.1		81.7		32.8		2.0		4.3		39.1		120.8	
Neurology (Neurosurgery)	Beds		34.6		17.6		52.2		28.5		2.6		3.4		36.6		78.8	
Neurology (Offices,Clinics)	Staff		0.0		0.0		0.0		3.6		0.0		0.0		3.6		3.6	
Neurology (Vascular Neurology)	Beds		72.7		25.3		98.0		19.7		3.2		3.1		26.0		124.0	
Nursery	Beds		91.1		12.3		103.4		22.0		0.0		0.4		22.4		125.8	
Obstetrics	Beds		31.2		4.2		35.4		28.4		11.7		3.6		35.7		71.2	
Ophthalmology/Urology	Beds		80.9		14.5		95.4		21.3		8.0		5.2		34.5		129.9	
Orthopedics	Beds		56.5		15.8		72.2		15.4		4.6		2.5		22.5		94.8	
Patient Check Out	Beds		63.5		5.6		69.1		5.5		4.0		1.5		11.0		88.2	
Psychiatry (Beds)	Beds		3.5		5.7		9.2		12.1		1.4		7.2		20.8		30.0	
Psychiatry (Offices)	Offices		0.0		0.1		0.1		1.3		2.0		1.3		4.6		4.7	
Short Stay Unit	Beds		6.0		1.0		7.0		3.4		2.4		0.7		6.5		13.4	
Surgery (General,Thoracic)	Beds		90.8		15.7		106.4		10.7		4.7		5.1		20.5		126.9	
Surgery (Plastic/General)	Beds		98.2		16.7		114.9		20.0		4.8		5.1		29.9		144.8	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Plastic															
			Non-Recyclable						Recyclable									
			Medical		Gloves		Total		Packaging		Food/Cont.		Polystyrene		Total		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Services Diagnostic																		
Cardiopulmonary	1000 Procedures		7.0		0.1		7.1		2.7		0.4		0.5		3.7		10.8	
Gastrointestinal Unit	1000 Procedures		603.2		79.2		682.4		59.0		0.9		3.1		63.1		745.5	
Neurophysiology	1000 Patients		4.7		1.8		6.6		17.2		2.1		2.8		22.2		30.8	
Nuclear Medicine	1000 Patients		5.8		10.4		16.1		3.4		0.5		0.7		4.6		20.8	
Obstetrics/Ultrasound	1000 Patients		24.9		25.5		50.5		31.3		0.0		1.5		32.8		83.3	
Ophthalmology	1000 Patients		3.3		4.8		8.1		3.3		0.3		0.5		4.1		12.1	
Radiology	1000 Exams		18.0		2.9		20.9		8.3		0.0		1.5		10.6		31.5	
Patient Services Service																		
Biomedical Engineering	1000 Repairs		0.0		0.0		0.0		1.1		0.2		0.0		1.4		1.4	
Cancer Clinic	1000 Patients		14.6		6.1		20.7		15.0		1.7		5.7		22.3		43.0	
Dialysis	1000 Patients		955.7		88.7		1044.5		32.2		11.3		18.3		61.8		1106.3	
Emergency	1000 Patients		113.8		35.5		149.3		23.9		4.0		4.7		32.5		181.8	
Fertility Clinic	1000 Patients		0.2		4.2		4.5		12.8		7.9		3.8		24.5		29.0	
Labour and Delivery	1000 Deliveries		647.7		243.7		891.3		151.4		52.5		23.6		227.6		1118.9	
Pharmacy	1000 Doses		1.4		0.1		1.4		0.1		0.0		0.0		0.1		1.5	
Recovery, Anaesthesia	1000 Operations		170.3		18.9		189.3		45.9		0.2		1.3		47.4		236.7	
Surgery	1000 Operations		435.7		60.1		495.8		0.0		0.0		0.1		0.1		495.9	
Patient Services Therapeutic																		
Audiology	1000 Procedures		3.9		3.0		6.8		3.9		0.1		0.6		4.6		11.4	
Occup. and Physio. Therapy	1000 Patients		0.6		0.7		1.3		3.5		4.6		2.9		11.0		12.3	
Psychology/Psychiatry Off./Clinic	1000 Patients		6.6		13.8		20.5		27.2		12.0		6.9		46.0		66.5	
Respiratory Therapy (Office)	Staff		0.9		0.0		0.9		1.5		0.3		0.5		2.4		3.2	
Social Work	Staff		0.0		0.0		0.0		0.0		21.3		12.7		34.0		34.0	
Speech Therapy	1000 Patients		0.5		0.9		1.4		2.9		0.7		0.8		4.5		5.8	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Plastic															
			Non-Recyclable						Recyclable									
			Medical		Gloves		Total		Packaging		Food/Cont.		Polystyrene		Total		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Laboratories																		
Biochemistry	1000 Samples		2.7		0.0		2.7		0.7		0.0		0.1		0.7		3.4	
Blood bank	1000 Samples		2.1		0.0		2.1		0.1		0.0		0.0		0.1		2.2	
Hematology	1000 Samples		0.8		1.7		2.6		1.6		0.0		0.0		1.6		4.2	
Microbiology/Infection Control	1000 Samples		28.4		2.8		31.1		6.0		0.6		0.1		6.6		37.8	
Oncology (Cancer Lab)	Staff		48.5		0.7		49.1		4.2		3.4		1.3		8.9		58.0	
Pathology	1000 Operations		13.1		0.0		13.1		21.0		1.0		1.7		23.7		36.8	
Morgue	Autopsies		0.7		0.5		1.2		1.1		0.0		0.0		1.1		2.4	
Research Lab	Staff		2.4		3.9		6.3		4.4		0.3		0.4		5.1		11.4	
Stat Lab	Staff		0.0		45.4		45.4		73.1		0.4		2.9		76.3		121.7	
Administration																		
Admissions	1000 Patients		7.1		0.0		7.1		0.0		0.0		3.9		3.9		11.0	
Finance, Admin, Other Offices	Staff		0.0		0.0		0.0		0.0		2.3		0.7		2.9		2.9	
Health Services	Staff		0.0		0.0		0.0		12.9		0.1		0.2		13.2		13.2	
Human Resources, Other Offices	Staff		0.0		0.0		0.0		0.0		0.2		0.0		0.2		0.2	
Locker Rooms	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.1		0.1	
MIS	Staff		0.0		0.0		0.0		0.3		0.3		2.4		3.1		3.1	
Medical Records	Staff		0.0		0.1		0.1		0.4		0.1		0.0		0.5		0.6	
Library	Staff		0.0		0.0		0.0		7.3		3.6		5.2		16.1		16.1	
Physicians Office	Staff		0.0		0.0		0.0		0.1		0.0		0.0		0.1		0.1	
Physicians Office, Waiting Rm	Staff		0.0		0.1		0.1		2.3		0.9		1.0		4.2		4.3	
Purchasing	Staff		0.0		0.0		0.0		5.5		2.3		1.8		9.6		9.6	
Residents Lodging	Beds		0.0		0.0		0.0		13.2		11.4		4.6		29.2		29.2	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Plastic															
			Non-Recyclable						Recyclable									
			Medical		Gloves		Total		Packaging		Food/Cont.		Polystyrene		Total		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Support Services																		
Coffee Shop	Staff		0.0		0.0		0.0		133.2		276.2		182.4		591.8		591.8	
Decontam	1000 meals		0.1		0.0		0.1		0.4		4.9		0.0		5.4		5.5	
Decontam (OR Waste)	1000 Operations		193.5		0.0		193.5		0.0		0.0		0.0		0.0		193.5	
Decontam (Packaging Waste)	1000 meals		0.0		0.0		0.0		0.0		0.5		1.1		1.6		1.6	
Dietetics	1000 meals		0.2		0.1		0.3		1.3		2.4		0.9		4.7		5.0	
Drug Store (Pharmacy)	Staff		0.6		0.0		0.6		0.1		0.1		0.1		0.2		0.9	
Dry Cleaning	Staff		0.0		0.0		0.0		13.5		0.7		0.2		14.4		14.4	
Engineering	Staff		0.0		1.2		1.2		0.7		1.3		0.5		2.5		3.7	
Housekeeping	Staff		0.0		0.0		0.0		0.0		0.8		0.0		0.8		0.8	
Inventory Control	Staff		85.3		2.5		87.7		232.1		13.3		21.4		266.7		354.5	
Receiving	Staff		0.0		0.0		0.0		180.1		0.4		92.2		272.7		272.7	
SPD Office	Staff		27.4		0.8		28.2		74.7		4.3		6.8		85.7		113.9	
Store (La Boutique)	Staff		0.0		0.0		0.0		41.1		0.0		0.0		41.1		41.1	
Telecommunication	Staff		0.0		0.0		0.0		0.9		3.5		0.0		4.3		4.3	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Glass													
			Recyclable Container						Non-Recyclable BoroS.						Total Glass	
			Clear		Amber		Total		Clear		Amber		Total			
			WF*	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Care																
Cancer Lodge	Beds		0.0		0.0		0.0		1.0		0.0		1.0		1.0	
Gen. Med. (Gerontology/Rheum.)	Beds		0.0		0.0		0.0		0.2		1.4		1.6		1.6	
Gen. Med. (Hem./Oncology)	Beds		12.7		0.0		12.7		1.8		0.9		2.8		15.5	
Gen. Med. (Nephrology)	Beds		4.3		0.0		4.3		0.5		0.9		0.5		4.8	
Gen. Med. (Pulmonary, Cardio)	Beds		4.2		0.0		4.2		0.7		0.5		1.2		5.4	
Gynecology	Beds		0.3		0.0		0.3		0.0		0.4		0.4		0.6	
Intensive Care Unit (ICU)	Beds		7.2		0.0		7.2		0.0		0.0		0.0		7.2	
Neurology (Neuro ICU)	Beds		0.0		0.0		0.0		1.9		3.0		4.9		4.9	
Neurology (Neurosurgery)	Beds		0.0		0.0		0.0		2.0		2.1		4.1		4.1	
Neurology (Offices,Clinics)	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Neurology (Vascular Neurology)	Beds		4.1		0.0		4.1		0.5		0.7		1.2		5.4	
Nursery	Beds		238.2		0.0		238.2		4.8		0.0		4.8		243.0	
Obstetrics	Beds		15.9		0.0		15.9		0.6		0.0		0.6		16.4	
Ophthalmology/Urology	Beds		3.9		0.0		3.9		0.0		0.0		0.0		3.9	
Orthopedics	Beds		0.0		0.0		0.0		0.1		3.1		3.2		3.2	
Patient Check Out	Beds		0.0		3.6		3.6		0.0		0.0		0.0		3.6	
Psychiatry (Beds)	Beds		0.0		0.0		0.0		0.2		1.1		1.4		1.4	
Psychiatry (Offices)	Offices		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Short Stay Unit	Beds		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Surgery (General,Thoracic)	Beds		0.0		0.0		0.0		0.1		0.0		0.1		0.1	
Surgery (Plastic/General)	Beds		14.8		0.0		14.8		0.5		2.8		7.3		18.1	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Glass												Total Glass	
			Recyclable Container						Non-Recyclable BoroS.							
			Clear		Amber		Total		Clear		Amber		Total			
			WF*	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Services Diagnostic																
Cardiopulmonary	1000 Procedures		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Gastrointestinal Unit	1000 Procedures		0.0		0.0		0.0		21.4		0.0		21.4		21.4	
Neurophysiology	1000 Patients		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Nuclear Medicine	1000 Patients		17.2		0.0		17.2		1.8		2.0		3.8		21.0	
Obstetrics/Ultrasound	1000 Patients		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Ophthalmology	1000 Patients		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Radiology	1000 Exams		2.4		0.0		2.4		2.7		0.0		2.7		5.1	
Patient Services Service																
Biomedical Engineering	1000 Repairs		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Cancer Clinic	1000 Patients		1.1		0.3		1.4		0.2		0.0		0.2		1.5	
Dialysis	1000 Patients		6.5		0.0		6.5		0.0		0.0		0.0		6.5	
Emergency	1000 Patients		5.8		0.0		5.8		0.0		0.0		0.0		5.9	
Fertility Clinic	1000 Patients		6.7		0.0		6.7		0.0		0.0		0.0		6.7	
Labour and Delivery	1000 Deliveries		45.2		0.0		45.2		1.6		0.0		1.6		46.8	
Pharmacy	1000 Doses		0.0		0.0		0.0		0.5		0.1		0.6		0.6	
Recovery, Anaesthesia	1000 Operations		7.1		0.0		7.1		0.0		0.0		0.0		7.1	
Surgery	1000 Operations		0.0		0.0		0.0		0.3		0.0		0.3		0.3	
Patient Services Therapeutic																
Audiology	1000 Procedures		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Occup. and Physio. Therapy	1000 Patients		10.4		0.0		10.4		0.0		0.0		0.0		10.4	
Psychology/Psychiatry Off./Clinic	1000 Patients		30.4		0.0		30.4		1.3		0.0		1.3		31.7	
Respiratory Therapy (Office)	Staff		0.0		0.0		0.0		0.0		0.5		0.5		0.5	
Social Work	Staff		25.8		0.0		25.8		0.0		0.0		0.0		25.8	
Speech Therapy	1000 Patients		23.2		0.0		23.2		0.0		0.0		0.0		23.2	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Glass													
			Recyclable Container						Non-Recyclable BoroS.						Total Glass	
			Clear		Amber		Total		Clear		Amber		Total			
			WF*	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Laboratories																
Biochemistry	1000 Samples		0.5		0.0		0.5		0.4		0.0		0.4		0.8	
Blood bank	1000 Samples		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Hematology	1000 Samples		0.0		0.0		0.0		0.9		0.3		1.1		1.1	
Microbiology/Infection Control	1000 Samples		0.0		0.0		0.0		0.1		0.0		0.1		0.1	
Oncology (Cancer Lab)	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Pathology	1000 Operations		11.1		0.0		11.1		0.0		0.0		0.0		11.1	
Morgue	Autopsies		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Research Lab	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Stat Lab	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Administration																
Admissions	1000 Patients		10.9		0.0		10.9		0.0		0.0		0.0		10.9	
Finance, Admin, Other Offices	Staff		0.9		0.0		0.9		0.0		0.0		0.0		0.9	
Health Services	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Human Resources, Other Offices	Staff		0.1		0.0		0.1		0.0		0.0		0.0		0.1	
Locker Rooms	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
MIS	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Medical Records	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Library	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Physicians Office	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Physicians Office, Waiting Rm	Staff		1.7		0.0		1.7		0.0		0.0		0.0		1.7	
Purchasing	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Residents Lodging	Beds		0.0		0.0		0.0		0.0		0.0		0.0		0.0	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Glass												Total Glass	
			Recyclable Container						Non-Recyclable BoroS.							
			Clear		Amber		Total		Clear		Amber		Total			
			WF*	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Support Services																
Coffee Shop	Staff		385.6		0.0		385.6		0.0		0.0		0.0		385.6	
Decontam	1000 meals		0.5		0.0		0.5		0.0		0.0		0.0		0.5	
Decontam (OR Waste)	1000 Operations		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Decontam (Packaging Waste)	1000 meals		0.5		0.0		0.5		0.0		0.0		0.0		0.5	
Dietetics	1000 meals		3.3		0.0		3.3		0.0		0.0		0.0		3.3	
Drug Store (Pharmacy)	Staff		0.0		0.0		0.0		0.0		3.8		3.8		3.8	
Dry Cleaning	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Engineering	Staff		0.0		17.2		17.2		0.0		0.0		0.0		17.2	
Housekeeping	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Inventory Control	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Receiving	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
SPD Office	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Store (La Boutique)	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Telecommunication	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Metal						Food		Liquids									
			Medical		Food		Total				Medical		Blood		Urine		Food		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Care																				
Cancer Lodge	Beds		0.0		7.4		7.4		49.3		0.0		0.0		0.0		0.0		0.0	
Gen. Med. (Gerontology/Rheum.)	Beds		0.3		4.1		4.5		23.6		3.1		0.0		0.0		1.2		4.3	
Gen. Med. (Hem./Oncology)	Beds		1.9		7.8		9.8		23.1		7.2		0.5		0.0		2.6		10.3	
Gen. Med. (Nephrology)	Beds		1.2		7.7		9.0		32.7		8.9		0.0		0.0		14.9		23.7	
Gen. Med. (Pulmonary, Cardio)	Beds		4.4		12.3		16.8		22.2		0.7		0.0		0.0		1.8		2.6	
Gynecology	Beds		0.2		4.4		4.6		7.9		3.5		5.6		0.0		2.2		11.2	
Intensive Care Unit (ICU)	Beds		3.2		8.9		12.1		10.9		14.0		3.1		0.0		0.0		17.1	
Neurology (Neuro ICU)	Beds		0.3		2.0		2.3		8.4		1.2		0.0		0.0		0.0		1.2	
Neurology (Neurosurgery)	Beds		0.1		4.5		4.6		5.9		0.9		0.0		0.0		0.0		0.9	
Neurology (Offices,Clinics)	Staff		0.0		0.0		0.0		2.0		0.0		0.0		0.0		0.0		0.0	
Neurology (Vascular Neurology)	Beds		1.2		6.1		7.4		11.1		2.1		0.3		0.0		14.6		17.0	
Nursery	Beds		0.6		0.5		1.1		0.0		0.0		2.0		0.0		0.0		2.0	
Obstetrics	Beds		0.6		0.4		1.0		19.6		3.6		0.0		0.0		0.0		11.6	
Ophthalmology/Urology	Beds		2.3		1.2		3.5		34.1		4.8		0.0		0.4		0.6		5.8	
Orthopedics	Beds		3.2		1.6		4.8		0.5		1.3		2.6		0.0		1.6		5.6	
Patient Check Out	Beds		1.6		7.8		9.4		64.8		106.1		0.0		0.0		0.0		106.1	
Psychiatry (Beds)	Beds		0.0		7.2		7.2		15.4		0.8		0.0		0.0		2.7		3.4	
Psychiatry (Offices)	Offices		0.0		1.6		1.6		10.3		0.0		0.0		0.0		0.0		0.0	
Short Stay Unit	Beds		0.1		1.5		1.6		4.0		2.3		0.0		0.0		0.0		2.3	
Surgery (General,Thoracic)	Beds		1.3		15.9		17.2		15.0		2.4		0.0		0.0		0.0		2.4	
Surgery (Plastic/General)	Beds		4.5		18.9		23.4		24.9		1.6		0.4		0.0		4.2		8.2	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Metal						Food		Liquids									
			Medical		Food		Total				Medical		Blood		Urine		Food		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Services Diagnostic																				
Cardiopulmonary	1000 Procedures		0.0		0.9		0.9		1.5		0.1		0.0		0.6		0.4		1.5	
Gastrointestinal Unit	1000 Procedures		2.5		1.5		3.9		57.1		70.0		0.0		0.0		0.0		70.0	
Neurophysiology	1000 Patients		0.0		2.5		2.5		25.9		0.4		0.0		0.0		0.2		0.6	
Nuclear Medicine	1000 Patients		0.0		1.2		1.2		0.0		0.0		0.0		0.0		0.0		0.0	
Obstetrics/Ultrasound	1000 Patients		0.0		1.4		1.4		2.2		0.0		0.0		0.0		0.0		0.0	
Ophthalmology	1000 Patients		0.0		0.1		0.1		3.1		0.3		0.0		0.0		0.0		0.3	
Radiology	1000 Exams		0.1		2.7		2.8		3.9		1.8		0.1		0.0		0.0		1.9	
Patient Services Service																				
Biomedical Engineering	1000 Repairs		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Cancer Clinic	1000 Patients		2.0		1.5		3.5		18.0		0.4		0.3		0.0		2.2		3.0	
Dialysis	1000 Patients		16.9		13.6		30.5		51.8		155.0		0.0		0.0		0.0		155.0	
Emergency	1000 Patients		2.3		19.8		22.1		10.2		45.7		0.0		0.0		0.0		45.7	
Fertility Clinic	1000 Patients		0.0		12.4		12.4		17.1		0.0		0.0		0.0		0.4		0.4	
Labour and Delivery	1000 Deliveries		1.5		39.5		41.0		109.0		34.9		0.0		8.2		0.0		43.1	
Pharmacy	1000 Doses		0.0		0.0		0.0		0.0		0.3		0.0		0.0		0.0		0.3	
Recovery, Anaesthesia	1000 Operations		0.0		0.0		0.0		0.7		25.0		1.8		0.0		0.0		26.8	
Surgery	1000 Operations		4.9		0.0		4.9		0.0		0.0		1.9		0.0		0.0		1.8	
Patient Services Therapeutic																				
Audiology	1000 Procedures		0.0		0.3		0.3		0.4		0.0		0.0		0.0		0.0		0.0	
Occup. and Physio. Therapy	1000 Patients		0.0		3.3		3.3		21.1		0.0		0.0		0.0		0.0		0.0	
Psychology/Psychiatry Off./Clinic	1000 Patients		0.0		18.5		18.5		38.7		0.0		0.0		0.0		0.0		[illegible]	
Respiratory Therapy (Office)	Staff		0.1		0.4		0.5		1.7		0.0		0.0		0.0		0.0		0.0	
Social Work	Staff		0.0		7.5		7.5		54.5		0.0		0.0		0.0		0.0		0.0	
Speech Therapy	1000 Patients		0.2		1.5		1.6		6.6		0.0		0.0		0.0		0.0		0.0	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Metal						Food		Liquids									
			Medical		Food		Total				Medical		Blood		Urine		Food		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Laboratories																				
Biochemistry	1000 Samples		0.0		0.0		0.0		0.2		0.2		0.0		0.0		0.0		0.2	
Blood bank	1000 Samples		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Hematology	1000 Samples		0.0		0.0		0.0		0.1		0.0		0.0		0.0		0.0		0.0	
Microbiology/Infection Control	1000 Samples		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Oncology (Cancer Lab)	Staff		2.7		2.4		5.1		3.7		0.0		0.0		0.0		1.1		1.1	
Pathology	1000 Operations		11.3		0.0		11.3		0.0		0.0		0.0		0.0		0.0		0.0	
Morgue	Autopsies		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Research Lab	Staff		0.0		0.4		0.4		3.2		0.0		0.0		0.0		0.0		0.0	
Stat Lab	Staff		0.0		4.6		4.6		96.8		0.0		0.0		0.0		0.0		0.0	
Administration																				
Admissions	1000 Patients		0.0		7.7		7.7		[illegible]		0.0		0.0		0.0		0.0		0.0	
Finance, Admin, Other Offices	Staff		1.0		0.6		1.6		3.3		0.0		0.0		0.0		0.0		0.0	
Health Services	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Human Resources, Other Offices	Staff		0.1		0.0		0.1		0.2		0.0		0.0		0.0		0.0		0.0	
Locker Rooms	Staff		0.0		0.1		0.1		0.0		0.0		0.0		0.0		0.0		0.0	
MIS	Staff		0.0		0.5		0.5		1.6		0.0		0.0		0.0		0.0		0.0	
Medical Records	Staff		0.0		0.3		0.3		0.0		0.0		0.0		0.0		0.0		0.0	
Library	Staff		0.0		0.0		0.0		16.8		0.0		0.0		0.0		0.0		0.0	
Physicians Office	Staff		0.0		0.0		0.0		0.3		0.0		0.0		0.0		0.0		0.0	
Physicians Office, Waiting Rm	Staff		0.0		1.6		1.6		6.9		0.0		0.0		0.0		0.1		0.1	
Purchasing	Staff		0.0		1.4		1.4		9.8		0.0		0.0		0.0		2.7		2.7	
Residents Lodging	Beds		0.0		5.9		5.9		39.5		0.0		0.0		0.0		0.0		0.0	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Metal						Food		Liquids									
			Medical		Food		Total				Medical		Blood		Urine		Food		Total	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Support Services																				
Coffee Shop	Staff		0.0		77.1		77.1		1811.6		0.0		0.0		0.0		0.0		0.0	
Decontam	1000 meals		0.0		0.0		0.0		56.4		0.0		0.0		0.0		28.4		25.4	
Decontam (OR Waste)	1000 Operations		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Decontam (Packaging Waste)	1000 meals		0.0		8.5		8.5		0.0		0.0		0.0		0.0		0.0		0.0	
Dietetics	1000 meals		0.0		8.5		8.5		25.0		0.0		0.0		0.0		0.2		0.2	
Drug Store (Pharmacy)	Staff		0.0		0.0		0.0		0.1		0.0		0.0		0.0		0.0		0.0	
Dry Cleaning	Staff		0.0		1.5		1.5		0.0		0.0		0.0		0.0		1.5		1.5	
Engineering	Staff		4.1		2.2		6.2		4.7		0.0		0.0		0.0		0.0		0.0	
Housekeeping	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Inventory Control	Staff		3.0		61.0		64.1		120.0		0.0		0.0		0.0		0.0		0.0	
Receiving	Staff		31.2		0.7		30.9		2.1		0.0		0.0		0.0		0.0		0.0	
SPD Office	Staff		0.0		19.6		19.6		40.3		0.0		0.0		0.0		0.0		0.0	
Store (La Boutique)	Staff		0.0		18.4		18.4		3.1		0.0		0.0		0.0		0.0		0.0	
Telecommunication	Staff		0.0		0.9		0.9		0.9		0.0		0.0		0.0		0.0		0.0	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Misc.		Total Recyclable		Total Non-Recyclable		Total Generated Waste	
			WF*	AW+	WF	AW	WF	AW	WF	AW
Patient Care										
Cancer Lodge	Beds		4.3		144.9		92.2		237.1	
Gen. Med. (Gerontology/Rheum.)	Beds		4.9		113.0		543.9		656.9	
Gen. Med. (Hem./Oncology)	Beds		35.3		175.4		442.6		617.9	
Gen. Med. (Nephrology)	Beds		11.6		160.7		375.0		535.6	
Gen. Med. (Pulmonary, Cardio)	Beds		4.5		137.2		481.1		618.2	
Gynecology	Beds		0.9		45.9		258.2		304.1	
Intensive Care Unit (ICU)	Beds		18.1		222.9		902.8		1125.7	
Neurology (Neuro ICU)	Beds		2.0		77.2		520.4		597.6	
Neurology (Neurosurgery)	Beds		1.4		61.9		291.3		353.2	
Neurology (Offices,Clinics)	Staff		0.0		176.0		472.4		648.4	
Neurology (Vascular Neurology)	Beds		10.1		108.4		476.8		585.2	
Nursery	Beds		4.6		484.6		806.0		1290.6	
Obstetrics	Beds		3.5		117.4		212.9		330.3	
Ophthalmology/Urology	Beds		7.3		156.4		257.7		414.1	
Orthopedics	Beds		3.9		67.6		291.2		358.8	
Patient Check Out	Beds		15.6		99.5		295.4		394.9	
Psychiatry (Beds)	Beds		2.7		56.8		136.8		193.6	
Psychiatry (Offices)	Offices		0.4		45.2		30.5		75.7	
Short Stay Unit	Beds		0.0		34.3		25.7		60.0	
Surgery (General,Thoracic)	Beds		10.0		207.8		337.6		545.5	
Surgery (Plastic/General)	Beds		7.3		190.6		378.6		569.1	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Misc.		Total Recyclable		Total Non-Recyclable		Total Generated Waste	
			WF*	AW+	WF	AW	WF	AW	WF	AW
Patient Services Diagnostic										
Cardiopulmonary	1000 Procedures		1.7		33.6		17.5		51.1	
Gastrointestinal Unit	1000 Procedures		0.0		205.4		1171.5		1376.9	
Neurophysiology	1000 Patients		9.8		479.3		66.2		545.5	
Nuclear Medicine	1000 Patients		1.2		65.3		36.3		101.7	
Obstetrics/Ultrasound	1000 Patients		2.7		87.1		223.4		310.5	
Ophthalmology	1000 Patients		0.0		42.8		29.3		72.1	
Radiology	1000 Exams		8.2		70.0		56.2		126.2	
Patient Services Service										
Biomedical Engineering	1000 Repairs		0.5		4.2		7.9		12.1	
Cancer Clinic	1000 Patients		61.7		117.1		173.1		290.2	
Dialysis	1000 Patients		31.7		603.7		1872.7		2476.4	
Emergency	1000 Patients		23.8		156.2		533.9		690.2	
Fertility Clinic	1000 Patients		0.5		108.6		70.2		178.9	
Labour and Delivery	1000 Deliveries		26.6		1330.0		3125.6		4455.6	
Pharmacy	1000 Doses		0.0		1.7		2.7		4.3	
Recovery, Anaesthesia	1000 Operations		5.3		145.4		312.6		457.9	
Surgery	1000 Operations		0.9		283.6		893.0		1096.6	
Patient Services Therapeutic										
Audiology	1000 Procedures		0.0		37.3		40.5		77.8	
Occup. and Physio. Therapy	1000 Patients		5.0		71.1		52.8		123.9	
Psychology/Psychiatry Off./Clinic	1000 Patients		11.6		726.4		272.7		999.1	
Respiratory Therapy (Office)	Staff		0.9		21.4		7.5		28.9	
Social Work	Staff		0.0		504.2		49.8		554.0	
Speech Therapy	1000 Patients		1.6		81.3		28.0		109.2	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Misc.		Total Recyclable		Total Non-Recyclable		Total Generated Waste	
			WF*	AW+	WF	AW	WF	AW	WF	AW
Laboratories										
Biochemistry	1000 Samples		0.3		5.4		4.3		9.6	
Blood bank	1000 Samples		0.1		1.0		2.7		3.7	
Hematology	1000 Samples		1.4		8.5		15.9		24.4	
Microbiology/Infection Control	1000 Samples		0.2		104.5		47.2		151.6	
Oncology (Cancer Lab)	Staff		3.1		56.1		90.9		147.0	
Pathology	1000 Operations		1.0		169.8		127.5		297.3	
Morgue	Autopsies		0.5		2.4		2.8		5.2	
Research Lab	Staff		0.0		15.0		44.7		59.7	
Stat Lab	Staff		78.9		1054.7		504.0		1558.7	
Administration										
Admissions	1000 Patients		2.6		482.9		75.4		558.3	
Finance, Admin, Other Offices	Staff		0.8		60.5		79.0		139.5	
Health Services	Staff		0.6		51.3		20.2		71.5	
Human Resources, Other Offices	Staff		0.1		3.9		5.3		9.2	
Locker Rooms	Staff		0.1		0.3		0.3		0.6	
MIS	Staff		1.4		79.1		5.9		85.0	
Medical Records	Staff		0.0		82.0		3.5		85.5	
Library	Staff		5.5		147.7		69.9		217.5	
Physicians Office	Staff		0.0		0.6		0.2		0.8	
Physicians Office, Waiting Rm	Staff		1.1		47.7		35.3		82.9	
Purchasing	Staff		11.2		145.8		60.0		205.8	
Residents Lodging	Beds		3.5		144.2		73.9		218.1	

General Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Misc.		Total Recyclable		Total Non-Recyclable		Total Generated Waste	
			WF*	AW+	WF	AW	WF	AW	WF	AW
Support Services										
Coffee Shop	Staff		98.9		3064.9		910.3		3975.2	
Decontam	1000 meals		0.4		64.2		21.0		85.1	
Decontam (OR Waste)	1000 Operations		0.0		0.0		580.4		580.4	
Decontam (Packaging Waste)	1000 meals		0.0		2.7		2.7		5.4	
Dietetics	1000 meals		0.7		65.2		5.8		71.0	
Drug Store (Pharmacy)	Staff		0.9		2.3		9.2		11.5	
Dry Cleaning	Staff		19.1		16.0		30.9		46.9	
Engineering	Staff		5.1		67.5		21.0		88.6	
Housekeeping	Staff		2.0		3.0		2.0		5.0	
Inventory Control	Staff		45.2		5423.8		502.6		5926.4	
Receiving	Staff		16.9		2766.2		107.4		2873.6	
SPD Office	Staff		12.4		466.3		159.6		625.9	
Store (La Boutique)	Staff		0.0		914.3		9.7		924.0	
Telecommunication	Staff		0.9		65.8		28.2		93.9	

Biomedical Waste Generation per Activity (kg/yr/Activity Descriptor)

Sections	Activity Descriptor	Activity Level	Sharps Container Wastes		Other Non-Anatomical Infectious		Sub Total		Anatomical Wastes		Cytotoxic Wastes		Sub Total		Total Biomedical Wastes	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Care																
Cancer Lodge	Beds		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Gen. Med. (Gerontology/Rheum.)	Beds		15.1		0.0		15.1		3.5		0.0		3.5		18.6	
Gen. Med. (Hem./Oncology)	Beds		29.7		11.0		40.7		0.0		7.9		7.9		48.6	
Gen. Med. (Nephrology)	Beds		46.5		3.7		50.3		0.0		0.0		0.0		50.3	
Gen. Med. (Pulmonary, Cardio)	Beds		12.4		24.6		37.0		6.8		0.0		6.8		43.9	
Gynecology	Beds		6.4		2.0		8.4		0.0		0.0		0.0		8.4	
Intensive Care Unit (ICU)	Beds		136.0		0.0		136.0		0.0		0.0		0.0		136.0	
Neurology (Neuro ICU)	Beds		58.8		0.0		58.8		19.9		0.0		19.9		78.7	
Neurology (Neurosurgery)	Beds		4.6		33.3		38.0		0.0		0.0		0.0		38.0	
Neurology (Offices,Clinics)	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Neurology (V[illegible] Neurology)	Beds		22.7		0.0		22.7		0.0		0.0		0.0		22.7	
Nursery	Beds		17.5		0.0		17.5		0.0		0.0		0.0		17.5	
Obstetrics	Beds		8.7		0.0		8.7		0.0		0.0		0.0		8.7	
Ophthalmology/Urology	Beds		21.4		1.5		22.9		0.0		1.5		1.5		24.4	
Orthopedics	Beds		7.8		0.0		7.8		0.0		0.0		0.0		7.8	
Patient Check Out	Beds		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Psychiatry (Beds)	Beds		1.7		0.0		1.7		0.0		0.0		0.0		1.7	
Psychiatry (Offices)	Offices		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Short Stay Unit	Beds		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Surgery (General,Thoracic)	Beds		32.6		0.0		32.6		0.0		0.0		0.0		32.6	
Surgery (Plastic/General)	Beds		37.2		0.0		37.2		0.0		0.0		0.0		37.2	

* WF = Waste Factor

+ AW = Annual Waste Quantity Calculate d from Waste Factor and Your Activity Level (kg/yr/Activity Descriptor)

Biomedical Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Sharps Container Wastes		Other Non-Anatomical Infectious		Sub Total		Anatomical Wastes		Cytotoxic Wastes		Sub Total		Total Biomedical Wastes	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Patient Services Diagnostic																
Cardiopulmonary	1000 Proc.		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Gastrointestinal Unit	1000 Proc.		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Neurophysiology	1000 Patients		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Nuclear Medicine	1000 Patients		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Obstetrics/Ultrasound	1000 Patients		43.8		0.0		0.0		0.0		0.0		0.0		0.0	
Ophthalmology	1000 Patients		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Radiology	1000 Exams		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Patient Services Service																
Biomedical Engineering	1000 Repairs		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Cancer Clinic	1000 Patients		0.0		45.8		45.8		0.0		0.0		0.0		45.8	
Dialysis	1000 Patients		25.5		0.0		25.5		0.0		0.0		0.0		25.5	
Emergency	1000 Patients		21.8		0.0		21.9		0.0		0.0		0.0		21.8	
Fertility Clinic	1000 Patients		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Labour and Delivery	1000 Deliveries		85.6		0.0		85.6		387.9		0.0		387.9		473.4	
Pharmacy	1000 Doses		0.7		0.4		1.0		0.0		0.3		0.3		1.3	
Recovery, Anaesthesia	1000 Operations		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Surgery	1000 Operations		0.0		0.0		0.0		86.7		0.0		86.7		86.7	
Patient Services Therapeutic																
Audiology	1000 Proc.		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Occup. and Physio. Therapy	1000 Patients		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Psychology/Psychiatry Offices/Clinics	1000 Patients		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Respiratory Therapy (Office)	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Social Work	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Speech Therapy	1000 Patients		0.0		0.0		0.0		0.0		0.0		0.0		0.0	

Biomedical Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Sharps Container Wastes		Other Non-Anatomical Infectious		Sub Total		Anatomical Wastes		Cytotoxic Wastes		Sub Total		Total Biomedical Wastes	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Laboratories																
Biochemistry	1000 Samples		2.4		0.0		2.4		0.0		0.0		0.0		2.4	
Blood bank	1000 Samples		29.5		7.6		37.2		0.0		0.0		0.0		37.2	
Hematology	1000 Samples		2.2		2.5		4.7		0.0		0.0		0.0		4.7	
Microbiology/Infection Control	1000 Samples		96.0		128.1		224.1		0.0		0.0		0.0		224.1	
Oncology (Cancer Lab)	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Pathology	1000 Oper.		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Morgue	Autopsies		0.0		3.3		3.3		14.3		0.0		14.3		17.7	
Research Lab	Staff		0.0		82.7		82.7		0.0		0.0		0.0		82.7	
Stat Lab	Staff		411.1		0.0		411.1		0.0		0.0		0.0		411.1	
Administration																
Human Resources, Other Offices	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
MIS	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Medical Records	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Library	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Physicians Office	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Physicians Office, Waiting Rm	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Purchasing	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Residents Lodging	Beds		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Admissions	1000 Patients		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Finance, Admin, Other Offices	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Locker Rooms	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Health Services	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	

Biomedical Waste Generation per Activity (Contd.)

Sections	Activity Descriptor	Activity Level	Sharps Container Wastes		Other Non-Anatomical Infectious		Sub Total		Anatomical Wastes		Cytotoxic Wastes		Sub Total		Total Biomedical Wastes	
			WF*	AW+	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW	WF	AW
Support Services																
Coffee Shop	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Decontam	1000 meals		0.8		0.0		0.8		0.0		0.0		0.0		0.8	
Decontam (OR Waste)	1000 Oper		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Decontam (Packaging Waste)	1000 meals		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Dietetics	1000 meals		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Drug Store (Pharmacy)	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Dry Cleaning	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Engineering	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Housekeeping	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Inventory Control	Staff		47.5		0.0		47.5		0.0		0.0		0.0		47.5	
Receiving	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
SPD Office	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Store (La Boutique)	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Telecommunication	Staff		0.0		0.0		0.0		0.0		0.0		0.0		0.0	

APPENDIX 2: WASTE MANAGEMENT CONTACTS

- Provincial and Territorial Regulators
- Waste Exchanges
- Provincial Recycling Organizations
- Specific Municipal Contacts in Ontario
- Specific Commercial Recycling Contacts

AUTHORITIES RESPONSIBLE FOR WASTE MANAGEMENT AND BIOMEDICAL WASTE IN EACH PROVINCE AND TERRITORY

They can provide information on regulations, Ministry policies and programs, as well as information on funding for waste management projects, if applicable.

Alberta

(Biomedical Waste Management)
Environmental Health Services Branch
Alberta Health
Seventh Street Plaza
10030 - 107 Street
Edmonton, Alberta T5J 3E4
(403) 427-5868

(Waste Management:General Information)
Waste Management Branch
Alberta Environment
9820 - 106th Street
Edmonton, Alberta T5K 2J6
(403) 427 5838

British Columbia
Waste Management Branch
Municipal Solid and Biomedical Waste Branch
Environmental Protection Division
Parliament Buildings
Victoria, British Columbia V8V 1X5
(604) 387-9971

Manitoba
Department of Environment, Workplace Safety and Health
Environmental Management Division
Box 7, Building 2
139 Tuxedo Avenue
Winnipeg, Manitoba R3N 0H6
(204) 945-7100

New Brunswick
Department of the Environment
P.O. Box 6000
Fredericton, New Brunswick E3B 5H1
(506) 457-4848

Newfoundland and Labrador
Department of Environment and Lands
Environmental Investigation Division
Confederation Building
St. John's, Newfoundland A1B 4J6
(709) 576-2565

Northwest Territories
Pollution Control Division
Department of Renewable Resources
Yellowknife, N.W.T. X1A 2L9
(403) 873-7654

Nova Scotia
Department of the Environment
P.O. Box 2107
Halifax, Nova Scotia B3J 3B7
(902) 424-5300

Ontario
Waste Management Branch
Ontario Ministry of the Environment
2 St. Clair Avenue West, 14th Floor
Toronto, Ontario M4V 1L5
(416) 323-5200

Prince Edward Island
Department of the Environment
11 Kent Street
Charlottetown, P.E.I. C1A 7N8
(902) 368-5000

Quebec
Operations Regionales
Ministere de l'environnement
5199 rue Sherbrooke est
Montreal, Quebec H1T 3X9
(514) 873-3636

Saskatchewan
Lands Protection Branch
Saskatchewan Environment
3085 Albert Street
Regina, Saskatchewan S4S 0B1
(306) 787-5811

Yukon
Department of Community and Transportation Services
Government of Yukon
P.O. Box 2703
Whitehorse, Y.T. Y1A 2C6
(403) 667-3032

Federal
Waste Management Branch
Environment Canada
Place Vincent Massey
Boulevard St. Joseph
Hull, Quebec K1A 1C8
(819) 953-1119

WASTE EXCHANGES OPERATING IN NORTH AMERICA
(January, 1991)

Waste Exchanges can help you locate markets for materials. Contact the one closest to you.

Alberta Waste Materials Exchange
Mr. William C. Kay
Alberta Research Council
P.O. Box 8330, Postal Station F
Edmonton, Alberta T6H 5X2
(403) 450-5408

British Columbia Waste Exchange
Mr. Tim Reeve,
102 - 1525 West 8th Avenue, Ste. 102,
Vancouver, B.C. V6J 1T5
(604) 731 7222

California Waste Exchange
Mr. Robert McCormick
Department of Health Services
Toxic Substances Control Division
Alternative Technology Section
P.O. Box 942732
Sacramento, CA 94234-7320
(916) 324-1807

Canadian Chemical Exchange
Mr. Philippe LaRoch
P.O. Box 1135
Ste-Adele, Quebec J0R 1L0
(514) 229-6511

Canadian Waste Materials Exchange
ORTECH International
Dr. Robert Laughlin
2395 Speakman Drive
Mississauga, Ontario L5K 1B3
(416) 822-4111, Ext. 265
Fax: (416) 823-1446

Enstar Corporation
Mr. J. T. Engster
P.O. Box 189
Latham, NY 12110
(518) 785-0470

Indiana Waste Exchange
Dr. Lynn A. Corson
Purdue University, School of Civil Engineering
Civil Engineering Building
West Lafayette, IN 47907
(317) 494-5036

Industrial Materials Exchange
Mr. Jerry Henderson
172 20th Avenue
Seattle, WA 98122
(106) 296-4633
Fax: (206) 296-0188

Industrial Materials Exchange Service
Ms. Diane Shockey
P.O. Box 19276
Springfield, IL 62794-9276
(217) 782-0450
Fax: (217) 524-4193

Industrial Waste Information Exchange
Mr. William E. Payne
New Jersey Chamber of Commerce
5 Commerce Street
Newark, NJ 07102
(201) 623-7070

Manitoba Waste Exchange
Dr. Beth Candlish
c/o Biomass Energy Institute Inc.
1329 Niakwa Road
Winnipeg, Manitoba R2J 3T4
(204) 257-3891

Montana Industrial Waste Exchange
Mr. Don Ingles
Montana Chamber of Commerce
P.O. Box 1730
Helena, MT 59624
(406) 442-2405

New Hampshire Waste Exchange
Mr. Gary J. Olson
c/o NHRRA
P.O. Box 721
Concord, NH 03301
(603) 224-6996

Northeast Industrial Waste Exchange Inc.
Mr. Lewis Cutler
90 Presidential Plaza, Suite 122
Syracuse, NY 13202
(315) 422-6572
Fax: (315) 422-9051

Ontario Waste Exchange
ORTECH International
Ms. Mary Jane Hanley
2395 Speakman Drive
Mississauga, Ontario L5K 1B3
(416) 822-4111
Fax: (416) 823-1446

Pacific Materials Exchange
Mr. Bob Smee
South 3707 Godfrey Blvd.
Spokane, WA 99204
(509) 623-4244

Peel Regional Waste Exchange
Ms. Lisa Morgan
Regional Municipality of Peel
10 Peel Centre Drive
Brampton, Ontario L6T 4B9
(416) 791-9400

RENEW
Ms. Hope Castillo
Texas Water Commission
P.O. Box 13087
Austin, TX 78711-3087
(512) 463-7773
Fax: (512) 463-8317

Resource Exchange & News
Ms. Kay Ostrowski
400 Ann Street, N.W., Ste. 201A
Grand Rapids, MI 49504-2054
(616) 363-3262

San Fransicso Waste Exchange
Ms. Portia Sinnott
2524 Benvenue, #35
Berkeley, CA 94704
(415) 548-6659

Saskatchewan Waste Exchange
Saskatchewan Research Council,
Mr. Eugene N. Ogu
515 Henderson Drive
Regina, Saskatchewan, S4N 3X1
(306) 787-9800

Southeast Waste Exchange
Ms. Maxie L. May
Urban Institute, UNCC Station
Charlotte, NC 128223
(704) 547-2307

Southern Waste Information Exchange
Mr. Eugene B. Jones
P.O. Box 960
Tallahassee, FL 32302
(800) 441-SWIX (7949)
(904) 644-5516
Fax: (904) 574-6704

Wastelink, Division of Tencon, Inc.
Ms. Mary E. Malotke
140 Wooster Pike
Milford, OH 45150
(513) 248-0012
Fax: (513) 248-1094

PROVINCIAL RECYCLING ORGANIZATION

These voluntary organizations provide information on various recycling initiatives in their province and some also produce newsletters.

Alberta:

Recycling Council of Alberta
P.O. Box 2100, Station M (#27)
Calgary, Alberta T2P 2M5

British Columbia:

Recycling Council of B.C.
102 - 1525 West 8th Avenue
Vancouver, B.C. V6J 1T5
(604) 731-7222
Fax: (604) 732-9253

Manitoba:

Recycling Council of Manitoba
412 McDermott Avenue
Winnipeg, Manitoba R3A 0A9
(204) 942-7781

Ontario:

Recycling Council of Ontario
P.O. Box 310, Station P
Toronto, Ontario M5S 2S8
(416) 960-1025, 960-0938
Toll Free: 1-800-263-2849

Quebec:

Fondo Quebecois de recuperation
407 blvd. St. Laurent, Ste 500
Montreal, Quebec H2Y 2Y5
(514) 874-3701

Saskatchewan:

Saskatchewan Environmental Society
P.O. Box 1372
Saskatoon, Saskatchewan S7K 3N9
(306) 665-1915 (Monday, Wed, Fri,9:30-2:30)

MUNICIPAL RECYCLING CONTACTS

Ontario:

Many municipalities in Ontario have hired recycling coordinators to help industry and institutions in their communities to find markets for potentially recyclable materials. In Ontario contact:

Association of Municipal
Recycling Coordinators
c/o ORTECH International
2395 Speakman Drive
Mississauga, Ontario L5K 1B3
(416) 822-4111

Contact your local municipal public works department to check if there is a recycling coordinator in your area.

Municipalities that currently offer Materials Recycling Directories for their areas are:

Essex Windsor Waste
Management Committee
360 Fairview Avenue
Essex, Ontario N8M 1Y6
(519) 776-6441

The Regional Municipality
of Hamilton Wentworth
Solid Waste Operations,
Dept. of Engineering
71 Main Street West
Hamilton, Ontario M5G 1Y8
(416) 546-2671

Metropolitan Works Dept.,
Refuse Disposal Division
439 University Avenue, 20th Floor
Toronto, Ontario M5G 1Y8
(416) 392-4200

Regional Municipality of Peel
Public Works Dept., Waste Reduction & Recovery
3190 Mavis Road
Mississauga, Ontario L5C 1T9
(416) 566-1511

Regional Municipality of Waterloo
Recycling Division
Marsland Centre, 20 Erb Street
Waterloo, Ontario N2J 4G7
(519) 747-5010

Other Contacts:

Hospitals can benefit by talking to each other. Hospital Networks for Environmental Issues may have already been formed in your area. If not, take the initiative and invite representatives from hospitals in your area to discuss their waste management strategies. In Ontario, the provincial network is:

Health Care Environment Network (HCEN)
c/o Public Affairs,
Sunnybrook Health Science Centre
2075 Bayview Avenue
Toronto, Ontario M4N 3M5
(416) 480-6100, ext. 4040
Fax: (416) 480-4588

SPECIFIC COMMERCIAL RECYCLING CONTACTS

Contact your provincial Waste Exchange, Recycling Council and/or Ministry of the Environment for help in locating markets, and for information on services and technologies for waste reduction, reuse or recycling. Some services may also be listed in the Yellow Pages in the Telephone Book.

The following list provides examples of contacts that are particularly relevant for hospitals.

Paper:

Paper Mills and brokers who purchase recycled paper.
e.g. Atlantic Packaging, Domtar, Quebec and Ontario Paper etc.

Food Waste:

(1) Reuse as Animal Feed:

Commercial: Contact local rendering companies or brokers listed in your Phone Book (e.g. Ontario Rendering Company,(Orenco))

Local Farmers: Contact local Agriculture Canada office to locate farmers who are certified to serve swill to their pigs

(2) Composting: Contact your Ministry of the Environment office, provincial recycling organizations, or:

Compost Council of Canada
55 Metcalf Street, Ste. 1300
Ottawa, Ontario K7O 6L5
(613) 238-4014
Fax: (613) 238-8642

Wood:

Pallets: Reuse
Ask suppliers to use only reusable pallets.
For further information , contact.

Canadian Wood Pallet and Container Association
P.O. Box 640
Pickering, Ontario L1V 3T3
(416) 831-3477

Unwanted medical equipment and supplies for supply to 3rd World Countries

Samaritans Purse,
Box 20100,Calgary Place
Calgary, Alberta T2P 4J2
(403) 250-6565
Fax: (403) 250-6567

Global Ed Med (GEMS)
77 Harbour Square,#3201
Toronto,Ontario.
M5J 2S2
(416) 533-3977
Fax (416) 533-9188

Liquid and Chemical Wastes

Anaesthetic Gases: For information on new initiatives in recycling anaesthetic gases contact:

Dusanka Filipovich, P.Eng.
123 Eglinton Avenue East
Toronto, Ontario M4P 1J3
(416) 488-1444, ext. 1443

Chlorofluorocarbons (CFCs):

Further information on issues and on-site recycling equipment can be obtained from:

Heating, Refrigeration and Air Conditioning
Institute of Canada (HRAI)
5468 Dundas Street West, Suite 308
Islington, Ontario M9B 6E3
(416) 239-8191
Fax: (416) 239-1983

Off-site Recycling: Contact your supplier

Solvents: Distill laboratory solvents with small on-site distillation units. Example of a supplier is:

Parkes Scientific Canada Inc.
76 Quesnell Road
Edmonton, Alberta T5R 5N2
(403) 484-1849
Fax: (403) 484-0601

Recycling: Commercial solvent recyclers may be interested in your solvents. Contact your provincial Ministry of the Environment, Waste Exchange, or hazardous waste hauler, to find recyclers nearest you

BIOMEDICAL WASTES

Placentae are collected for extraction of γ globulins. One company that picks up placentae from healthy births across Canada is:

Bockneck Ltd.
165 Bethridge Road
Rexdale, Ontario M9W 1N4
(416) 745-0796

Service provided: Includes pick-up placentae;
provide boxes and small freezer;
payment of 35¢/lb for placenta pick-up service

ENERGY AUDITS

Contact your local or provincial Hydro for information on how to be more energy efficient.

PURCHASING PRACTICES

For information on purchasing products recognized by Environment Canada as most environmentally appropriate in specific product categories (i.e with the ECOLOGO symbol) contact:

Environmental Choice Program,
107 Sparks St.,
Ottawa,Ontario
K1A OH3.

APPENDIX 3: LIST OF CONVERSION FACTORS

Conversion Factors:

1 tonne	=	1000 kg	=	2,200 lbs
1 kg	=	2.2 lbs		
1 m^3	=	1.3 yd^3	=	35.3 ft^3

Typical Waste Container Sizes

3.1 m^3	=	4 yd^3
4.6 m^3	=	6 yd^3
6.2 m^3	=	8 yd^3
15.4 m_3	=	20 yd^3
30.8 m^3	=	40 yd^3

HELPFUL CONVERSIONS IN DESIGNING RECYCLING PROGRAMS

Material	Weight (kg) or Number (#) per 90 gal Container *	Approximate Weights of Individual Items (kg) Where Appropriate
Glass		
Juice Containers (single serving)	900 #	0.175
Metal		
Juice Containers	900#	0.020
Food Containers	900#	0.175
Drums (45 gal)		17 kg
Plastic		
Drums (45 gal)	-	14-16 kg
Paper		
Computer Printout	275 kg	-
Newspaper	225 kg	-
Old Corrugated Cardboard	180 kg	-
Office Paper	250 kg	-
Diapers (small) disposable	-	0.2
Wood		
Pallets		
Hardwood	-	14
Softwood	-	9

*90 gal. containers are often used in recycling programs to collect materials.

APPROXIMATE DENSITY CONVERSIONS

Material	Uncompacted kg/m^3	Compacted* kg/m^3	Volume Reduction by Processing
Glass	300 - 350	600 - 1,180	2:1
Metal			
Cans			
Aluminum	30 - 40	250	7:1
Ferrous	85	240 - 290	3:1
Scrap Metal			
Heavy	2,400		
Light	600		
Tin	95		
Municipal Waste	250		
Plastic			
Miscellaneous Bottles	30	415	13:1
Paper			
Computer Printout	390	780	2:1
Newspaper	215 - 300	430 - 600	2:1
Old Corrugated Cardboard	25 (loose)	240 - 340	10:1
	225 (flat)	450	2:1
Office Paper	65 - 120 (crumpled)	360	~ 4:1
Textiles	175		
Wood			
Crates	100		
Trimmings	570		

*For average compactor with 2-3:1 compaction ratio

APPENDIX 4: EXAMPLES OF SPECIFIC WASTE REDUCTION, REUSE AND RECYCLING ACTIVITIES

EXAMPLES OF SPECIFIC WASTE REDUCTION, REUSE AND RECYCLING ACTIVITIES

Reduction

- Use 2 sided copying
- Use electronic mail (i.e. personal computers or phone messages)
- Buy in bulk (e.g. food and drink containers in Cafeteria and soaps and detergents in Housekeeping)
- Avoid products with excess packaging and work with suppliers to reduce it
- Reroute publications such as magazines, newspapers and journals
- Circulate memos or documents
- Use bulletin boards for posting announcements
- Single space texts
- Use 2-way envelopes for billing
- Make sure staff understand how to use equipment to reduce wastage
- Use the reduction feature on your copier to fit more than 1 paper per page
- Use permanent tape dispensers - not disposable ones
- Use refillable pens - instead of disposable ones
- Purchase durable equipment, furnishings and supplies
- Install energy efficient appliances, e.g. lighting
- Use water saving devices
- Turn off lights and office equipment when not in use
- Use incinerators that meet the new discharge guidelines and that have an energy recovery system

- Use computer fax software to send fascimilies without making hard copies
- Use non-solvent liquid scintillation cocktails in laboratories
- Use less hazardous radioactive materials where appropriate
- Develop microtesting procedures to reduce chemical usage
- Make sure biomedical waste is properly segregated from general waste to reduce disposal costs and increase materials for recycling
- Explore opportunities to reduce formalin usage in sample analysis by replacing with cold, physiological saline solutions where appropriate
- Substitute formalin solutions with commercially available, less toxic cleaning solutions in dialysis machines.

Reuse

- Donate used publications to Doctors' offices, nursing homes or local library
- Reuse worn cloth diapers and towels as rags
- Reuse scrap paper for notepads and draft copies
- Reuse old envelopes by applying labels (with non-solvent glues) on top of old addresses
- Use reusable diapers, incontinence, and underpads where appropriate
- Use reusable urine trays
- Use reusable drapes and gowns where appropriate
- Institute a "lug-a-mug" program for staff to use reusable mugs
- Encourage staff to use reusable lunch containers if they bring their own lunch
- Use a linen service in washrooms instead of paper towels if appropriate
- Use durable items in the Cafeteria as much as possible. Examples include mugs, dishware, utensils, napkins
- Repair old equipment or furniture and purchase those that are easy to repair
- Reuse old file folders
- Reuse packaging materials at receiving to ship out your packages
- Reuse shredded paper for packaging
- Ask suppliers to provide reusable shipping containers and packaging materials and a pick-up service
- Install solvent recovery systems to reuse laboratory solvents on-site
- Purchase CFC recovery units for on-site reuse
- Develop on-site sterilization and reuse system for medical procedural trays, where appropriate, or contract services of other hospitals which have this capability

Recycle

- Newspapers and telephone books can be given to farmers or Humane Societies as bedding
- Recycle used towels and rags to rag recyclers
- Use plain paper fax machines - it is recyclable and the messages will not fade
- Recycle the following items in "blue box" programs, where available:
  - glass bottles from juice bottles or baby formula
  - juice and food metal containers
  - newspapers
  - plastic containers (e.g. pop containers or other types where appropriate)
- Recycle cardboard with commercial recycler or through your supplier
- Recycle pallets with commercial recycler or through your supplier
- Include pick-up of containers as part of supplier's role in your contracts
- Work with suppliers to help them design workable packages that are recyclable
- Send unwanted old equipment, furniture or medical supplies overseas
- Pool local businesses together who recycle materials and contract for the services of the same recycler to reduce pick-up costs
- When purchasing products, ensure that all packages can be returned to supplier or recycled at your facility
- Use distribution network system to recycle materials back to a central location for better material marketing
- Explore waste recycling options for food waste:
  (1) human food
  (2) animal feed either directly or through a commercial processor
  (3) composting or vermiculture and use compost at your facility in landscaping
- Contract a shredding company that recycles your shredded paper
- Involve ambulatory patients in waste minimization programs, e.g. psychiatric and geriatric patients in composting projects

- For large waste generators, explore processing equipment such as balers or compactors for recyclable materials

- Locate markets for recyclable materials which are generated in sufficient quantities, such as
  - office paper
  - cardboard
  - wood
  - plastics
  - solvents (xylenes, toluenes, CFCs)
  - oils: vegetable
    hydraulic
  - construction and demolition materials such as drywall, asphalt, concrete, wood

- Install silver recovery units for photo processing wastewaters

- Evaluate opportunities for anaesthetic gas recycling

- Recycle healthy placentae

Purchasing Practices

- Purchase recycled content materials where appropriate, e.g. office paper, envelopes, toilet tissue, paper towels, and look for the "Environmental Choice" logo from Environment Canada. Work with Purchasing Committees to determine which products may be suitable

- Work with suppliers to have oversized packaging materials returned or recycled

- Use building construction products with recycled content materials (e.g. drywall, asphalt)

- Use environmentally responsible vehicles and maintenance products, e.g. propane as fuels, rerefined oils, retreaded tires, recycled antifreeze